UNIVERSIDADE NOVA DE LISBOA

Escola Nacional de Saúde Pública

Clustering of major behavioral risk factors in the Portuguese population with diabetes and their association with self rated health

Elsa de Fátima Sequeira Mourato Costa

Dissertation Presented in Fulfillment of the Requirements
for the Degree Doctor of Philosophy in Public Health
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RESUMO

Esta tese teve como objetivos (i) identificar a ocorrência conjunta dos quatro principais fatores de risco relacionados com comportamentos, nomeadamente, o tabagismo, o consumo excessivo de álcool, o sedentarismo e a dieta desequilibrada na população portuguesa com idade igual ou superior a 15 anos com e sem diabetes auto relatada, observando-se a variação entre os diferentes grupos sociodemográficos e (ii) explorar a associação entre a ocorrência conjunta dos fatores de risco relacionados com comportamentos na população com diabetes auto relatada e a sua autoapreciação do estado de saúde (AES). No âmbito destes objetivos, foram analisados os dados do 4º Inquérito Nacional de Saúde (INS) e publicados três artigos científicos. As variáveis para os fatores de risco relacionados com comportamentos como o tabagismo, o consumo excessivo de álcool e o sedentarismo foram definidas com base nas perguntas do inquérito, enquanto a informação disponível no 4º INS sobre os hábitos alimentares não permite avaliar diretamente a dieta da população portuguesa, de acordo com as recomendações internacionais.

Portanto, começámos por desenvolver uma metodologia para avaliar o padrão alimentar da população portuguesa com e sem diabetes, tendo em consideração as recomendações internacionais para uma dieta pouco saudável (Artigo I). Assim, o objetivo geral deste artigo foi identificar indicadores de um padrão alimentar não saudável baseado na informação auto relatada sobre os hábitos alimentares do 4º INS e identificar subgrupos da população com diferentes padrões alimentares. Para definir os indicadores de padrão alimentar foram consideradas algumas variáveis do 4º INS e depois criámos um *score* para dicotomizar as variáveis. A análise de classes latentes (ACL) foi usada para classificar os indivíduos em grupos com diferentes padrões alimentares. Foram definidos três indicadores de padrão alimentar não saudável: *i)* dieta não

diversificada, *ii)* não consumo de frutas e vegetais e *iii)* número de refeições principais por dia inferior a três. Foram identificadas duas classes: padrão alimentar não saudável (classe 1) e padrão alimentar saudável (classe 2) para os indivíduos com e sem diabetes. A maior proporção de participantes foi classificada na classe padrão alimentar não saudável, tanto em indivíduos com diabetes como em indivíduos sem diabetes (81.9% e 73.9%).

De seguida investigámos a ocorrência conjunta dos principais fatores de risco relacionados com comportamentos (tabagismo, consumo excessivo de álcool, sedentarismo e dieta desequilibrada) e a variação entre os diferentes grupos sociodemográficos em dois grupos da população portuguesa, um com diabetes e outro sem diabetes, porque o agrupamento dos fatores de risco relacionados com comportamento em indivíduos e populações é importante para estudar os seus padrões e planear intervenções e decisões em saúde pública no controle de doenças e na promoção da saúde (Artigo II). Neste artigo, a ocorrência conjunta foi avaliada por comparação da frequência observada e esperada das diferentes combinações possíveis entre os quatro fatores de risco. Foi ajustado um modelo de regressão logística múltipla para analisar a variação sociodemográfica na ocorrência conjunta dos quatro fatores de risco relacionados com comportamentos. Entre a população portuguesa inquirida, 8.9% dos indivíduos com diabetes e 19.5% dos indivíduos sem diabetes têm dois ou três fatores de risco relacionados com comportamentos. Os fatores de risco relacionados com comportamentos foram analisados considerando todas as combinações múltiplas possíveis (k=16). Em indivíduos diabéticos a combinação mais frequente de dois ou mais fatores de risco relacionados com comportamentos foi tabagismo, consumo excessivo de álcool e dieta desequilibrada. O tabagismo e o consumo excessivo de álcool foi a combinação mais frequente em indivíduos não diabéticos. Os resultados sugerem que a probabilidade de indivíduos com dois ou mais comportamentos de risco em simultâneo é maior em homens, dos 35 aos 44 anos de idade e com baixo nível de educação, tanto em indivíduos com diabetes como em indivíduos sem diabetes.

Por fim, analisámos a associação entre os padrões de fatores de risco relacionados com comportamentos na população portuguesa com 15 ou mais

anos de idade com diabetes e a sua AES (Artigo III). A AES foi classificada como positiva (Muito Bom ou Bom) e negativa (Razoável, Mau ou Muito Mau). Foi utilizada a técnica estatística de ACL para classificar os indivíduos em grupos com padrões de fatores de risco comportamentais. Entre a população com idade≥ 15 anos, 11% relata AES positiva e 89% relata AES negativa. Homens, jovens, com nível de escolaridade elevado e divorciados foram associados com AES positiva. A atividade física e a alimentação saudável foram associadas com a AES positiva, após o ajuste para as características sociodemográficas. Foram identificados três padrões de fatores de risco comportamentais: fisicamente inativos, fumadores e bebedores. Os resultados deste estudo poderão ser um contributo importante para o desenho de programas específicos destinados a melhorar a saúde pública. A perceção do estado de saúde é essencial para um melhor planeamento em saúde, não só devido ao seu papel como determinante da saúde, mas também porque ela está relacionada com a adoção de comportamentos de promoção da saúde.

As principais conclusões deste trabalho de investigação são as seguintes:

● Os padrões alimentares foram diferentemente associados, principalmente, com o sexo, idade, nível de escolaridade e estado civil, entre os indivíduos com diabetes e sem diabetes auto reportada e a ACL identificou dois grandes grupos da população com e sem diabetes auto relatada com diferentes padrões alimentares.

● A classificação dos indivíduos nestes grupos pode contribuir para analisar o padrão alimentar em indivíduos de outros estudos.

● Entre a população portuguesa, 8.9% dos indivíduos com diabetes auto reportada têm dois ou três fatores de risco relacionados com comportamentos e o padrão de comportamento que indicou um maior aumento do que o esperado foi a ocorrência conjunta de três fatores de risco: fumar, consumo excessivo de álcool e dieta desequilibrada.

● Foram identificados os grupos mais vulneráveis à ocorrência simultânea de dois ou mais fatores de risco comportamentais para a diabetes: homens que têm 35-44 anos, solteiros e que frequentaram o ensino secundário.

● Os nossos resultados sugerem que os comportamentos associados com uma boa AES na população com diabetes auto relatada com 15 ou mais anos de idade são a atividade física, o consumo de álcool, a alimentação saudável e o não fumar.

● Foram identificados três padrões de fatores de risco comportamentais: fisicamente inativos, fumadores e bebedores entre a população com diabetes com idade ≥ 15 anos. A identificação destes padrões discerníveis é importante para o desenvolvimento de intervenções específicas em programas de controlo da diabetes.

ABSTRACT

This thesis aimed (i) to identify the clustering of four major behavioral risk factors namely smoking, heavy drinking, physical inactivity and unhealthy diet in a Portuguese population aged 15 years and over with and without self-reported diabetes highlighting the variation across different socio-demographic groups and (ii) to explore the association between the clustering of behavioral risk factors in the population with self-reported diabetes and their self rated health (SRH). In the scope of these objectives, data from the fourth Portuguese National Health Interview Survey (NHIS) was analyzed and three scientific papers were published. The outcome variables for the behavioral risk factors as smoking, heavy drinking, physical inactivity have been defined based on the questions of the survey, whereas the information available regarding eating habits does not allow to assess the diet of the Portuguese population according to international recommendations directly from the questions.

Therefore, we started by developing a methodology to assess the dietary pattern of the Portuguese population with and without diabetes, taking into consideration the international recommendations for an unhealthy diet (Paper I). Thus, the general purpose of this paper was to identify indicators of an unhealthy dietary pattern based on self reported information about eating habits from the fourth Portuguese NHIS and to identify subgroups of the population with different dietary patterns. To define dietary pattern indicators, some NHIS variables were considered and then we created a score to dichotomize the variables. Latent class analysis was used to classify individuals in different dietary patterns groups. Three unhealthy dietary pattern indicators were established: *i)* dietary non diversity, *ii)* non consumption of fruit and vegetables and *iii)* number of main meals per day below three. Two classes were identified: unhealthy dietary pattern (class 1) and healthy dietary pattern (class 2) for

individuals with and without diabetes. The highest proportion of participants was classified into the class of unhealthy dietary patterns both in individuals with and without diabetes (81.9% and 73.9%).

Then, we investigated the clustering and variation across different socio-demographic groups of the major behavioral risk factors (smoking, heavy drinking, physical inactivity and unhealthy diet) in two groups of the Portuguese population, one with and one without diabetes. Because the behaviour related risk factors cluster together in individuals and populations it is important to study their patterns to inform public health interventions and decisions aimed at controlling disease and promoting health (Paper II). In this paper, clustering was evaluated by comparing the observed and expected frequency of the different possible combinations of the four risk factors. A binary multiple logistic regression model was fitted to examine the socio-demographic variation in the clustering of the four behavioral risk factors. Among the Portuguese population surveyed, 8.9% of individuals with diabetes and 19.5% of individuals without diabetes accumulated two or three behavioral risk factors. Behavioral risk factors were explored considering all possible multiple combinations (k=16). The most frequent combination of two or more risk behavioural factors was smoking, heavy drinking and unhealthy diet in diabetic individuals. Smoking and heavy drinking was the most frequent combination in non-diabetic individuals. The findings suggest that the likelihood of individuals having two or more risk behaviours simultaneously was greater in men 35-44 years old and lower education level both in individuals with and without diabetes.

Finally we explored the association between the behaviour risk factor patterns in the Portuguese population aged 15 years and older with diabetes and their SRH (Paper III). SRH was categorized as positive (very good or good) and negative (fair, bad or very bad). LCA statistical techniques were used to classify individuals in groups of behavioral risk factor patterns. Among the population aged ≥ 15 years, 11% reports positive SRH and 89% reports negative SRH. Male gender, younger age, higher level of education and divorced marital status were all associated with positive SRH. Physical activity and healthy diet were associated with positive SRH, after adjusting for socio demographics characteristics. Three behavioral risk factor patterns were identified: physically

inactive, smokers and heavy drinkers. The findings of this study will be an important contribution for the design of specific programmes aimed at improving public health. The perception of health status is essential for better planning in health, because it is related with the adoption of health promoting behaviours.

The main conclusions of the present investigation are the following:

• The dietary patterns were differentially associated mainly with sex, age, education level and marital status values among individuals with and without self-reported diabetes and LCA identified two major groups of the population with and without self-reported diabetes with different dietary patterns.

• The classification of individuals into these groups may contribute to analyze the dietary pattern in individuals of other studies.

• Among the Portuguese population 8.9 % of individuals with self-reported diabetes accumulated two or three behavioral risk factors and the behavior pattern that indicated a greater increase than that expected at random was the simultaneous occurrence of the three risk factors: smoking, heavy drinking and unhealthy diet.

• The most vulnerable groups to the simultaneous occurrence of two or more risk behaviours for diabetes were identified: men who have 35-44 years, single, who have secondary education.

• Our findings suggest that behaviors associated with positive SRH in population with self reported diabetes aged 15 years and over are regular physical activity, alcohol consumption, healthy diet and not currently smoking.

• Three behavioral risk factors patterns were identified: physically inactive, smokers and heavy drinkers among the population with diabetes aged ≥ 15 years. Identification of these discernible patterns is important to develop specific interventions in control programmes for diabetes.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

CDC	Centers for Disease Control and Prevention
CI	Confidence Intervals
CVD	Cardiovascular Disease
DDS	Diet Diversity Score
E	Expected
FVS	Food Variety Score
IDF	International Diabetes Federation
LCA	Latent Class Analysis
NAD	Nicotinamide Adenine Dinucleotide
NADH	Nicotinamide Adenine Dinucleotide Hydrogen
NHIS	National Health Interview Survey
O	Observed
OR	Odds Ratio
SES	Socioeconomic Status
SPSS	Statistical Package for the Social Sciences
SRH	Self-Rated Health
T1D	Type 1 Diabetes
T2D	Type 2 Diabetes
WHO	World Health Organization

1. INTRODUCTION

Increases in the prevalence of smoking, heavy drinking, unhealthy diet and physical inactivity are the principal causes of non-communicable diseases in terms of morbidity and mortality (Poortinga, 2007; Gómez et al., 2012). There is ample epidemiological evidence that these four behavioral risk factors contribute to the development of chronic conditions, such as Type 2 Diabetes (T2D) and cardiovascular disease (Galán et al., 2005; Gómez et al., 2012; WHO, 2009a). The T2D is the most common form of diabetes and accounts for over 90 % of all diabetes cases worldwide (Gonzalez et al., 2009). Furthermore, health behaviours and risk factors are associated with self-rated health (SRH) (Manderbacka et al., 1999). Benjamins et al. (2004) examined the relationship between SRH and mortality and reported that one of the causes of death that show a strong association with SRH is diabetes. This study uses the US Health Interview Survey linked to mortality data from the US Death Index to examine the association between self-reported health and a comprehensive set of underlying cause of death and multiple cause of death categories (Benjamins et al., 2004).

It is important to investigate the clustering of behavioral risk factors because of possible synergistic health effects. There is some evidence that combinations of behavioral risk factors are more detrimental to people's health than can be expected from the added individual effects alone (Slattery et al., 2002; Gómez et al., 2012), suggesting that the health effects of lifestyle risk factors are multiplicative rather than additive. Insight into clustering of lifestyle risk factors is important because this can be used in developing preventive strategies. In this context it is important to know if we can discriminate subgroups with elevated clustering so that prevention can be better targeted and organized (Schuit et al., 2002). Hence, the study of the clustering of risk factors has important

implications on both disease risk and the development of preventive interventions targeting the combination of risk factors rather than individual risk factors (Gómez et al., 2012). To date, research on the association between health's related behaviours and SRH has been limited (Verger et al., 2009; Darviri et al., 2011). Only a few studies have evaluated SRH in community samples of people with diabetes and there is a lack of information regarding the association between SRH and diabetes specific problems (Badawi et al., 2012). Thus, this research derived from two general research questions that provided the basis for development of the present study, namely:

i) How are the behavioral risk factors clustered in the Portuguese population with and without diabetes?

ii) What is the association between the clustering of behavioral risk factors in the Portuguese population with diabetes and their SRH?

1.1 Diabetes mellitus

1.1.1 Definition and classification

Diabetes mellitus is a chronic metabolic disorder characterized by a chronic hyperglycemia status with disturbances of carbohydrate, fat and protein metabolism as a result of defects in insulin secretion, impaired effectiveness of insulin action, or both and is associated with micro vascular and macro vascular complications (American Diabetes Association, 2011; Alberti et al., 1998; Sudagani et al., 2005). Diabetes represents a major public health problem in Portugal with an estimated prevalence of 12.9 % (Gardete et al., 2013). The disease is classified as Type 1 diabetes (T1D), T2D, gestational diabetes and other types of diabetes, including monogenic diabetes (American Diabetes

Association, 2011). Type 1 and type 2 diabetes are considered the two major types. T1D is normally caused by an auto-immune destruction of the insulin-producing β-cells, primarily due to an autoimmune-mediated reaction, leading to insulin deficiency (Sudagani et al., 2005) and it normally develops before adulthood. The reason why this occurs is not fully understood. In general, the disease is diagnosed at any age, but most frequently it develops during childhood and puberty. T1D is one of the most common endocrine and metabolic conditions in childhood and progresses rapidly (Fourlanos et al., 2005). The number of people who develop T1D is increasing. The reasons for this are still unclear but may be due to changes in environmental risk factors, early events in the womb, diet early in life, or viral infections (International Diabetes Federation, 2013). T2D is usually associated with relative insulin deficiency or insulin resistance, either of which may be present at the time that diabetes becomes clinically manifest. T2D is the most common type of diabetes. It usually occurs in adults, but is increasingly detected in children and adolescents (International Diabetes Federation, 2013; Sudagani et al., 2005). Both cross-sectional and longitudinal studies have demonstrated that the earliest detectable abnormality in T2D is an impairment of the body´s ability to respond to insulin (Stumvoll et al., 2005; DeFronzo, 1992). T2D can remain undetected (asymptomatic), for many years and the diagnosis is often made from associated complications or accidentally through an abnormal blood or urine glucose test (Alberti et al., 1998).

1.2 Etiopathophysiology of type 2 diabetes

T2D results from a defect in insulin action, hepatic glucose output and insulin secretion (Karam et al., 2011; Zimmet et al., 2001). Although insulin resistance is frequently the first detectable abnormality in the progression of T2D, insulin resistance by itself does not cause the disease, which is only manifested when there is a coexisting insulin secretory defect (Zimmet et al., 2001). Insulin is a hormone that is produced by pancreatic beta cells and is the hormone that

regulates glucose metabolism. Insulin molecules circulate throughout the blood stream until they bind to their associated (insulin) receptors. The insulin receptors stimulates uptake of glucose from the blood in the muscle and fat tissue, storage of glucose as glycogen in the liver and muscle cells. In addition, insulin inhibits the breakdown of proteins, the hydrolysis of triglycerides and the production of glucose from amino acids, lactate and glycerol (International Diabetes Federation, 2013). The insulin causes the liver to convert stored glycogen into glucose, thereby increasing blood glucose. Glucagon, which is also secreted by the endocrine pancreas, has the opposite effects to that of insulin. Glucagon stimulates insulin secretion, so that glucose can be used by insulin-dependent tissues. Hence, glucagon and insulin are part of a system that keeps blood glucose at the appropriate level (Figure 1).

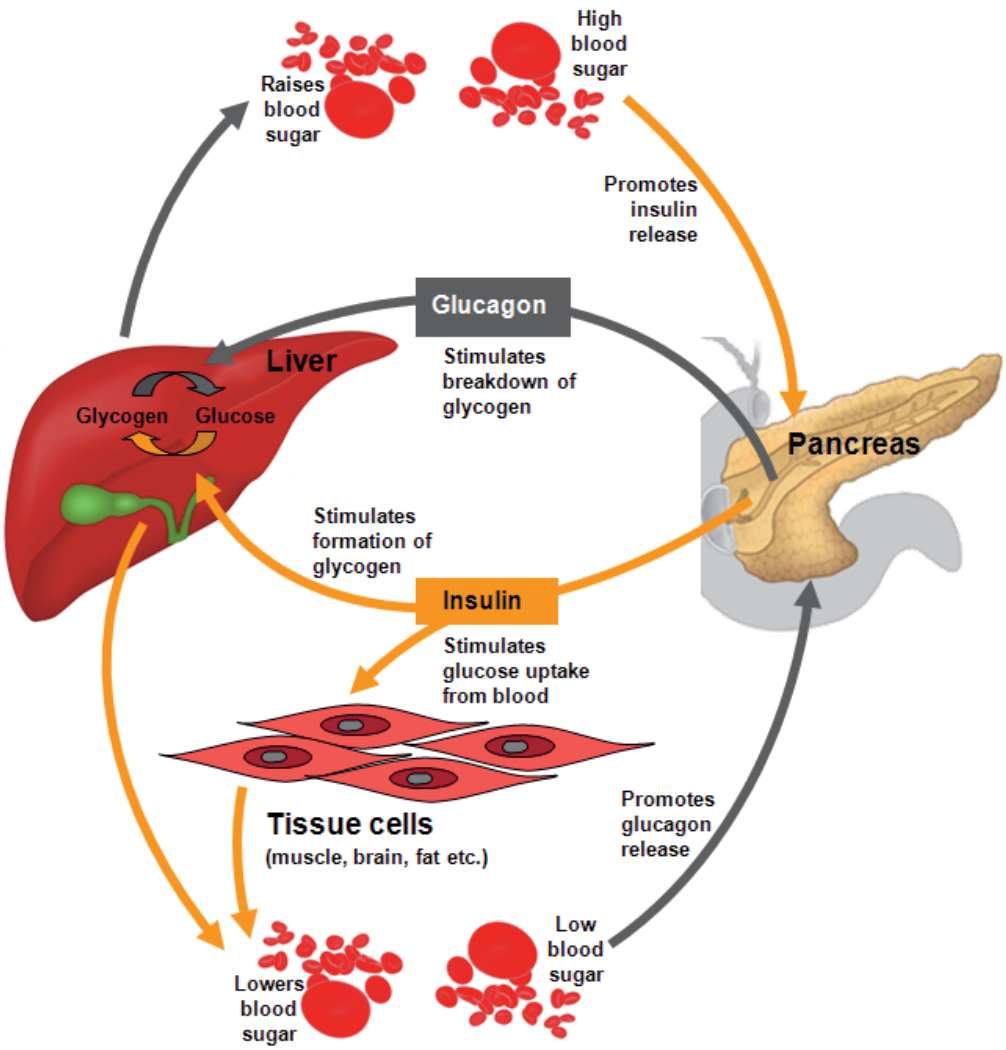

Figure 1 Insulin production and action. Redrawn and modified after the IDF Diabetes Atlas

T2D and its associated hyperglycaemia or dysglycaemia is often a manifestation of a much broader underlying disorder. This includes the metabolic syndrome (sometimes called syndrome X), a cluster of cardiovascular disease risk factors that, in addition to glucose intolerance, includes hyperinsulinaemia, dyslipidaemia, hypertension, visceral obesity, hypercoagulability and microalbuminuria (Zimmet et al., 2001). Insulin resistance is an important precursor of T2D and is in its early stages reversible by weight loss and/or increased exercise. However, by the time people have developed abnormal glucose levels, the pancreas has already been damaged and there is less opportunity for improving insulin sensitivity (UK. Department of Health, Physical Activity, Health Improvement and Prevention, 2004).

1.3 Epidemiology of type 2 diabetes

According to the International Diabetes Federation (IDF), 382 million people (8.3% of adults) have diabetes worldwide and the number of people with the disease is set to rise beyond 592 million in less than 25 years (International Diabetes Federation, 2013). Between 2010 and 2030, there is an expected 70% increase in numbers of adults with diabetes in developing countries and a 20% increase in developed countries (Shaw et al., 2009). The majority of the 382 million people (International Diabetes Federation, 2013) with diabetes are aged between 40 and 59, and 80% of them live in low- and middle-income countries. All types of diabetes are increasing, in particular T2D. The number of people with diabetes will increase by 55% by 2035 (International Diabetes Federation, 2013). Whereas the prevalence of diabetes in Europe is expected to go up 21% by 2025, there will be an 80% rise in the Middle East and Africa. This marked increase is attributed to rapid social and cultural changes in recent decades and the adoption of high risk lifestyle (obesity and sedentary life style). Increasing life expectancy has resulted in a sharp rise in the number of elderly people which has in turn contributed to this growing prevalence (Correia et al., 2010). IDF estimates that as many as 175 million people worldwide (International

Diabetes Federation, 2013), or close to half of all people with diabetes, are unaware of their disease. Most of these cases are T2D. T2D represents over 90% of diabetes around the world and is largely the result of excessive body weight and physical inactivity (Karam et al., 2011). Genetic factors probably identify those most vulnerable to these changes (Shai et al., 2006).

The first diabetes prevalence study in Portugal (Correia et al., 2010), identified a prevalence of 11.7% of diabetes in the Portuguese population during 2009. This study comprised 5167 subjects and it was performed using the 2001 Portuguese Census, a random sample of people aged between 20 and 79 years was selected from 122 units representative of the distribution of the Portuguese population. A significant difference was found between men (14.2%) and women (9.5%). People with aged between 20 and 39 years, 2.4% had diabetes, making T2D an increasing problem at a younger age. Almost 44% of people with diabetes were unaware of their condition. The percentage of undiagnosed cases is much higher in the younger age group (Correia et al., 2010). The prevalence of diabetes in 2012 was 12.9% of the Portuguese population (1 million individuals estimated) (Gardete et al., 2013) aged between 20 and 79 years of which 56% of individuals that had already been diagnosed and 44% are undiagnosed. In 2013 were detected 160 new cases of diabetes per day. The disease has higher prevalence in men (15.6%) than in women (10.7%). In 2014 there were 18.2 new cases of T1D per 100 000 young people aged between 0-14 years, which is significantly higher than in 2004. With respect to the senior population, more than one in every four of people with aged 60-79 years have diabetes (Gardete et al., 2013).

1.4 Complications of type 2 diabetes

T2D has classically been associated with multiple complications. The severe complications accompanying T2D are mostly microvascular (e.g. retinopathy, neuropathy and nephropathy) and macro vascular diseases, leading to reduced

quality of life and increased morbidity and mortality from end-stage renal failure and cardiovascular disease (CVD) (Karam et al., 2011). The development and progression of the vascular complications, which often persist and progress despite improved glucose control, possibly result of prior occurrences of hyperglycemia. Increased cardiovascular risk, however, appears to begin before the development of hyperglycemia, presumably because of the effects of insulin resistance. This phenomenon has been described as the "ticking clock" hypothesis of complications (Haffner et al., 1999), where the clock starts ticking for microvascular risk at the onset of hyperglycemia, and for macro vascular risk at some antecedent point, i.e. with the onset of insulin resistance. It is generally accepted that the long-term complications of diabetes mellitus are far less common and less severe in people who have well-controlled blood sugar levels (Nathan et al., 2005; Nathan et al., 2009).

The familial clustering of the degree and type of diabetic complications indicates that genetics may also play a role in causing diabetic complications (Monti et al., 2007). Although not fully understood, the complex mechanisms by which diabetes leads to these complications involves hyperglycemia and both functional and structural abnormalities of small blood vessels along with accelerating factors such as smoking, elevated cholesterol levels, obesity, high blood pressure and lack of regular exercise (Karam et al., 2011).

1.5 Behavioral risk factors of type 2 diabetes

T2D is due to a combination of both genetic and behavioral factors. Inspite the genetic alterations that predispose a person to diabetics, its activation requires the presence of specific behavioral factors, particularly those which are associated with the lifestyle. Smoking, heavy drinking, physical inactivity, unhealthy diet are the most frequently documented risk factors for T2D (Karam et al., 2011).

World Health Organization (WHO) defined as a global strategy for the prevention and control of chronic diseases, such as T2D reducing the risk levels of the four behavioral risk factors referred above (WHO, 2008a). The choice of these risk factors is justified for several reasons. First, by their nature potentially preventable, although they depend in large part on individual and collective choices; secondly, because through the intervention addressed to each one it is possible to change the risk of death and disease of individuals and population; finally, because these behavioral risk factors occur together in individuals and populations, interventions aimed at each of these risk factors may potentially change the levels of all the others (Laaksonen et al., 2003; Whitlock et al., 2002). Currently, there is extensive evidence that these behavioral risk factors contribute to an increase in morbidity and mortality due to the development of chronic diseases such as CVD, T2D and cancer, among others (Gómez et al., 2012).

1.5.1 Smoking

Smoking is the largest single cause of premature death and illness in the word (WHO, 2002). Smoking currently kills five million people a year worldwide and, according to estimates, will probably kill eight million people a year between now and 2030 and one billion over the course of the 21st century (Mathers et al., 2006). If current trends are maintained, in 2030 about 10 million people per year may die prematurely due to tobacco consumption worldwide, half of which in the age group 35-69 years (Ezzati, 2003). It was estimated that at the beginning of XXI century about one billion and 100 million people over 15 years of age would be smokers worldwide and an increase of approximately 500 million smokers was expected until 2025 (World Bank, 2003).

Centers for Disease Control and Prevention (CDC) suggest that the projected prevalence of smoking among adults in 2050 could still be as high as 15%. Trends in smoking rates among youth and adults show progress, but the prevalence of current smoking among youth and adults is only slowly declining

and the actual number of youth and young adults starting to smoke has increased since 2002 (U.S. Centers for Disease Control and Prevention, 2014). According to the CDC due to the slow decline in the prevalence of current smoking, the annual burden of smoking-attributable mortality can be expected to remain at high levels for decades into the future, with 5.6 million youth currently 0 to 17 years of age projected to die prematurely from a smoking-related illness (U.S. Centers for Disease Control and Prevention, 2014). According to the fourth Portuguese National Health Interview Survey (NHIS) carried out in Portugal in 2005-2006 (Portugal.MS.INSA.INE, 2009), 20.9% of participants aged 15 years and over were smokers.

Smoking is related to the premature development of multiple complications of diabetes. Smoking leads to insulin resistance and inadequate compensatory insulin secretion response (Attvall et al., 1993; Facchini et al., 1992). This could be due to a direct effect of nicotine or other components of cigarette smoke on beta cells of the pancreas as suggested by the association of cigarette smoking with chronic pancreatitis and pancreatic cancer (Talamini et al., 1999). Nephropathy has been reported as common in type 1 diabetic patients who smoke, and smoking increases the risk for microalbuminuria in T2D (Haire-Joshu et al., 1999). In addition to the vasoconstrictor effect of nicotine, the tobacco consumption increases the levels of carbon monoxide and the blood coagulability, which results in the reduction of oxygen supply to the tissues and in exposure body to toxic substances, some of them cancerous (Boyle et al., 2005).

Several prospective studies reported that smoking is a risk factor for developing T2D (Willi et al., 2007; Haire-Joshu et al., 1999). A meta-analysis including 25 prospective studies showed that smoking was associated with a 44% increased risk of diabetes. The association between smoking and T2D was stronger for heavy smokers≥ 20 cigarettes/day compared with light smokers or former smokers (Willi et al., 2007). The relationship between smoking and the development of nephropathy in type 1 and 2 diabetes has been documented in several studies (Haire-Joshu et al., 1999).

Among the social and biological determinant factors of smoking, genetic factors seem to explain the aggregation of smoking habits in people of the same family

(Sullivan et al., 1999). However, more recent studies seem to suggest a major influence of the social factors in young ages, increasing the influence of genetic factors lifelong (Vink et al., 2003).

1.5.2 Heavy drinking

The WHO (WHO, 2006) considered alcohol as the third most important risk factor for the increase in the number of disability-adjusted life years in Portugal, as well as in Europe. Statistics on alcohol consumption from the World Drink Trends placed Portugal in 21th place in the consumption ranking in 2010 (WHO, 2014a).

Alcohol consumption, an important lifestyle factor, seems to be associated with the risk of developing T2D. Despite this knowledge there has been relatively little focus on how alcohol consumption influences the glycemic control in type 2 diabetic subjects (Pietraszek et al., 2010). The metabolism of alcohol (90% of which takes place in the liver) suppresses the oxidation of the other nutrients, as alcohol cannot be deposited in the organism. It is well-known that alcohol metabolism inhibits the gluconeogenesis, shifts the NADH/NAD-ratio, inhibits the beta-oxidation of fatty acids and inhibits glycogenolysis (Pietraszek et al., 2010). Intake of higher amounts of alcohol affects all tissues, organs and systems of human body, so the excessive alcohol consumer has an increased risk of various diseases (Mailliard et al., 2004).

Numerous studies have investigated the acute effects of alcohol on plasma glucose in healthy and type 1 diabetic subjects while little information exists about type 2 diabetic subjects (Pietraszek et al., 2010). Epidemiological studies on the effect of alcohol consumption on the health of the Portuguese population are relatively scarce, considering the high levels of consumption regularly estimated for the population (WHO, 2010c).

Regarding the determinant factors of alcohol consumption, it can be stated that the consumption of beverages containing alcohol is strongly influenced by socio-cultural factors, frequently associated with the culture and with the dietary

pattern (Dietler, 2006). The National Health Plan (2012-2016) considers individual, family and social factors as determinants associated to alcohol consumption in reducing of alcohol related diseases (Portugal.MS.IDT, 2009). Among the main individual determinants a higher frequency of alcohol consumption between men suggests that gender is a major determinant of alcohol consumption (Holmila et al., 2005). Between social and economic determinants, also associated with gender, the higher degree of education and the higher income, appear associated with lower alcohol consumption (WHO, 1999). In Portugal, this relationship has not been consistently observed (Lopes et al., 2008).

According to WHO, excessive alcohol consumption refers to a consumption pattern that exceeds an acceptable or moderate consumption and according to WHO is a concept equivalent to the one of the dangerous consumption (WHO, 1994). CDC considers two "excessive alcohol consumption" patterns: 1) Binge drinking defined as the consumption of four or more drinks for women, or five or more drinks for men, in the same occasion; and 2) Heavy drinking defined as consuming an average of more than 2 drinks for men and 1 drink or more for women, per day (U.S. Centers for Disease Control and Prevention, 2013). A standard drink was that containing 10 g of alcohol, which in Portugal is a glass of beer, a glass of wine or a measure of distilled alcohol beverage (Aguiar et al., 2012). According to Vidal et al. (2005) daily alcohol consumption is assessed by average number of servings per day × mean volume of each serving × mean % alcohol (12% for wine, 5% for beer, 20% for liquor and 40% for spirits) × 0.8 (alcohol density) for each type of alcoholic beverage. Total alcohol consumption in the day is assessed by summing up the individual amounts for each type of alcoholic beverage.

The absence of agreed methods for the measurement of excessive alcohol consumption, usually referred to people aged 15 years and over, results in inconsistencies in data because they are obtained in different populations or times, suggesting caution in the comparative interpretations (WHO, 1999). The fourth Portuguese NHIS performed in representative samples of the Portuguese population allows creating indicators of the consumption frequency of various types of alcoholic beverages in the 12 months and in the seven days preceding

the interview, as well as the volume consumed in the seven days preceding the interview (Portugal.MS.INSA.INE, 2009).

1.5.3 Physical inactivity

According to WHO, physical inactivity is the fourth risk factor most important for the death from all causes, accounting for 6% of deaths (WHO, 2009a; WHO, 2010a).

Physical inactivity is a major risk factor for the development of T2D. T2D is more common among people who are physically inactive (UK. Department of Health, Physical Activity, Health Improvement and Prevention, 2004). The effect of exercise on physical health among patients with diabetes is well documented. Exercise reduces glycosylated haemoglobin, resulting in decreased incidence of stroke, CVD, urinary albumin excretion, retinopathy and all-cause mortality (Campbell et al., 2011). Among those at high risk of developing T2D (those having one or more of overweight, high blood pressure, or family history of T2D), physical activity can reduce the risk of developing the disease by up to 64% (UK. Department of Health, Physical Activity, Health Improvement and Prevention, 2004). The reduction in risk can be seen across a range of physical activity patterns and intensities. However, at present the precise type, intensity, frequency, duration or volume of activity needed to protect against T2D are unknown (Bull, FC and the Expert Working Groups, 2010). Physical activity reduces the activity of the cells in the pancreas which produce insulin (pancreatic *ß*-cells) and makes the cellular tissues more sensitive to insulin. Physical activity may also increase the rate at which glucose is taken into the muscles, independent of the activity of insulin (UK. Department of Health, Physical Activity, Health Improvement and Prevention, 2004). Increasing physical activity levels before the onset of impaired glucose tolerance appears to have the greatest potential for preventing T2D (Bull, FC and the Expert Working Groups, 2010).

Longitudinal studies have found physical inactivity to be a strong risk factor for T2D (Almdal et al., 2008). There is good evidence that regular physical activity reduces the risk of CVD in the general population. Several studies have assessed the association between physical activity or physical fitness and the risk of CVD mortality among patients with T2D (Hu et al., 2007). Prospective studies have suggested that people who exercise have a 33-50% lower risk of developing T2D and that the greater amounts of exercise taken, the lower the risk of developing the disorder. Walking and cycling levels are also associated with reduced risk of T2D: those who walk or cycle more are less likely to get T2D (UK. Department of Health, Physical Activity, Health Improvement and Prevention, 2004).

A variety of organizations, including the CDC, the American College of Sports Medicine, the National Institutes of Health of the United States and the WHO have suggested that every adult should have at least 30 minutes moderate-intensity physical activity (such as brisk walking, cycling, swimming, home repair, and yard work) on most, preferably all days of the week (Hu et al., 2007). In Portugal the results suggest that the inclusion of both physical activity frequency and physical activity intensity engaged in context of the professional activity decrease the inactivity levels in the population with less education and less differentiated professions (Portugal. MS. DGS, 2012).

WHO identifies three types of physical inactivity determinants, which should be taken into account in inactivity control: 1) individual factors, such as attitudes in relation to physical activity, or beliefs about the ability of each one to have appropriate physical activity; 2) The micro-environment, e.g, the place where the people live, learn and work; and 3) The macro-environment, which includes the social and economic, cultural and environmental conditions (WHO, 2007). The individual characteristics that have been used to explain the occurrence of physical inactivity are the education level, occupation and profession. However, these factors have complex relationships with other variables such as gender, ethnicity or religion (Marmot et al., 2005). The different roles that men and women adopt in the social context where they live, for example, determine largely the frequency and physical activity type (WHO, 2007). According to

WHO physical inactivity continues to be more common among disadvantaged groups, contributing to inequalities in obesity distribution (WHO, 2007).

1.5.4 Unhealthy diet

An unhealthy diet is a main risk factor for several chronic diseases, among others obesity, stroke, cancer and T2D (Thiele et al., 2004). The latest published National Food Consumption Survey performed on a representative sample of the Portuguese population was conducted in 1981 (Portugal.MS.INSA, 1981).

The WHO issued specific recommendations for a healthy diet: eating more fruit, vegetables, legumes, nuts and grains; cutting down on salt, sugar and fats. It is also advisable to choose unsaturated fats, instead of saturated fats and towards the elimination of trans-fatty acids. Intake of fruits and vegetables has been associated with a lower risk of CVD as well as a lower risk of many diet-related cancers and other chronic diseases prevailing highly in Western societies (Waijers et al., 2005). High quality diet in terms of the consumption of vitamins, minerals and trace elements is positively associated with income, education level, age, food diversity, sport activity and vegetarianism. On the other hand, a low quality diet as indicated by high intakes of e.g. fat, sugar, alcohol and sodium can be expected when energy intake is high, for individuals of middle age and for pregnant and breast-feeding women (Thiele et al., 2004).

The nutrients essential to meet nutritional requirements are not all found in a single food item but come from a diet composed of a number of foods (Hatloy et al., 1998). A measure of the nutritional quality of the diet may therefore be its diversity and numerous proposals have been put forward to determine the best adapted diet (Gauthier-Chelle et al., 2004; Hatloy et al., 1998). The Food Variety Score (FVS) and Diet Diversity Score (DDS) are two indexes that reflect diet quality. The FVS was defined as the number of different food items eaten during the registration period. All food items were given the same weight (Kourlaba et al., 2009). FVS counts all the food items consumed. Used alone it

can therefore give a falsely favourable impression of the quality of the diet (Kourlaba et al., 2009). FVS is an important indicator of the quality of the diet because a diet with a higher number of items allows greater nutrient adequacy (Hatloy et al., 1998). The DDS was defined as the number of food groups consumed by each people (Kourlaba et al., 2009). A high DDS will reflect a consumption of foods from several food groups, and such a diet may therefore also have a higher nutritional quality (Kourlaba et al., 2009). The two diet variety scores were not based on amounts or frequencies, but only on the respondent confirming to have consumed certain foods during the recording period (Torheim et al., 2003). Both food variety indexes reflect diet quality and are simple tools that can be used for comparing groups within the population and to trace changes in diet variation and diet quality over time (Torheim et al., 2003).
The effect of social and economic determinants in eating habits has been evidenced in recent decades, suggesting a direct association between the health behaviour and social and economic levels due to greater accessibility to healthier foods and to greater knowledge about healthy diet principles (Popkin et al., 2005; Darmon et al., 2008).

1.6 Clustering of behavioral risk factors

As stated previously each behavioral risk factor (smoking, heavy drinking, physical inactivity and unhealthy diet) has important effects on health. However, individual and population health status is not only dependent on a single isolated risk factor but on groups of risk factors that often coexist in the same time, in the same person and frequently in the same population. Although lifestyle variables, such as smoking, independently affect health status, interdependences among these factors are frequently observed. A combination of lifestyle practices may introduce a health risk that is greater than would be expected from the sum of the individual factors (Hulshof *et al*., 1992). These behavioral risk factors are associated with each other in a complex and

uncompletely understood way (Fine et al., 2004; Pronk et al., 2004; WHO, 2009a).

Lifestyle behaviors have an important impact on the health of a population. Modifiable risk factors as tobacco use, physical inactivity, excessive alcohol consumption, and low intake of fruits and vegetables are listed among the ten leading causes of death in developing countries (WHO, 2009a). In addition, individuals who exhibit these four behaviors concurrently may have the life expectancy reduced by 14 years (Khaw et al., 2008). Despite the fact that most studies have focused on the independent effect of each lifestyle factor on disease risk, some publications (Ford et al., 2009; Heidemann et al., 2009) have studied the synergistic effect of several combined lifestyle factors on health risk. This is particularly important given that lifestyle factors tend to cluster in individuals (Gómez et al., 2012). Research has suggested a clustering pattern of these unhealthy behaviors (Fine et al., 2004; Galán et al., 2005), indicating the possibility that the interaction between them can increase their health consequences. However, few studies have investigated the cluster of unhealthy behaviours and population subgroups that are most affected by these clusters.
Several studies have found a consistent socio-demographic gradient in the prevalence of multiple risk factors, with men, younger age groups and those in lower social classes and with lower levels of education being more likely to exhibit multiple lifestyle risks (Berrigan et al., 2003; Chiolero et al., 2006; Poortinga, 2007; Schuit et al., 2002).

According to the literature review few research studies were carried out in Portugal to study the clustering of health determinants (Dias et al., 2012). Also, few studies have investigated the associations between several behavioral risk factors and risk of T2D (Smith, 2007).

The latest National Health Plan 2012-2016, recommends the intervention on multiple determinant of health related lifestyles, choosing tobacco, alcohol, diet, physical activity and safe sexuality (Portugal.MS.DGS, 2012). However, this plan does not refer the clustering of these determinants, nor the interventions targeting groups of factors.

Clustering of behavioral risk factors has been studied recently in various populations, mostly using data from National Health Surveys or other studies

conducted on representative samples of the population (Berrigan et al., 2003; Lawder et al., 2010).

1.6.1 Clustering of behavioral risk factors in a general population

The four behavioral risk factors assessed in the following studies are: smoking, heavy drinking, physical inactivity and unhealthy diet. Several epidemiological studies have shown elevated risk of mortality associated with certain behavioral habits. Burke et al. (1997) examined these four behavioral risk factors among Australian 18 years old (301 males and 282 females) and showed that smoking, drinking alcohol to excess and adverse dietary choices clustered among men and women, with physical inactivity also clustering among women.

Schuit et al. (2002) investigated the prevalence and clustering of behavioral risk factors in 16,489 Dutch men and women, aged 20-59 years to define subgroups with elevated clustering. These findings suggested that common behavioral risk factors cluster among adult subjects. The study developed by Schuit et al. (2002) show that about 20% of the subjects had at least three behaviour risk factors. Prevalence of risk factors was higher among unemployed, low-educated subjects and those who had experienced health deterioration. All behavioral risk factors showed significant clustering, except for low physical activity and excessive alcohol consumption.

Poortinga (2007) investigated the prevalence and clustering of four major lifestyle risk factors from the 2003 Health Survey for England dataset comprised 11,492 individuals aged 16 years and over, using British health recommendations. A majority of the English population has multiple lifestyle risk factors at the same time and the clustering was more pronounced for women than for men. This study found that both smoking and heavy drinking cluster with low fruit/vegetables intake as well, whereas some have identified an association between smoking and drinking (Jensen et al., 2003; Chiolero et al., 2006).

1.6.2 Clustering of behavioral risk factors in a population with chronic disease

Chronic disease including CVD, cancer, chronic obstructive lung disease and diabetes are the leading causes of death and disability worldwide and account for approximately 60% of all deaths worldwide (WHO, 2009a). However, more than 30% of causes of death are preventable, since the main risk factors are modifiable, including smoking, heavy drinking, physical inactivity and unhealthy diet (WHO, 2011).

Alamian et al. (2009) assessed the prevalence, socioeconomic distribution and clustering of five chronic disease behavioral risk factors (physical inactivity, sedentary behaviour, tobacco smoking, alcohol drinking and high body mass index) in a representative sample of Canadian children and adolescents aged 10-17 years. The results indicate that 65% of Canadian youth had two or more behavioral risk factors, including 37% with at least three risk factors. Only 10% of youth did not have any of the five risk factors. These findings are similar to those of a study (Sanchez et al., 2007) conducted in adolescents aged 11-15 years in San Diego, CA., in which nearly 80% of adolescents were sedentary, physically inactive and did not meet dietary guidelines for fat and fruits/vegetables intake. The prevalence of having four or five behavioral risk factors found in a study developed by the Alamian et al. (2009) is also comparable to a study (Lawlor et al., 2005) conducted among 14 year old Australians in which 10% of participants reported having three or four risk factors including tobacco smoking, high levels of TV viewing, overweight and high blood pressure. In the study conducted by the Alamian et al. (2009) the prevalence of having multiple behavioral risk factors was greater among older youth and those from low socioeconomic status families. These results corroborate with the studies developed by Fine et al. (2004), Laaksonen et al. (2003), Pronk et al. (2004) and Schuit et al. (2002), where low education and low income predicted having three or more unhealthy behaviours. Studies investigating the clustering of risk factors for chronic conditions vary greatly regarding the sets of factors under study, which makes comparisons between different studies difficult (Dumith et al., 2012).

1.6.3 Importance and relevance

In Portugal there is a big gap on information about the clustering of behavioral risk factors in population groups with diabetes.

Despite the epidemiological investigation performed on each of the behavioral risk factors associated with many chronic diseases, most preventive interventions is further addressed to each of these isolated factors ignoring their clustering (Atkins et al., 2004; Curry, 2004). The knowledge about the clustering of behavioral risk factors in the Portuguese population is scarce as mentioned. The clustering of these risk factors may predict increased risk and provide the opportunity of health and economic gains if it is considered in the planning of population and public health interventions. The first priority of England's government (Buck et al., 2012) was to reform the public health system, focusing behaviour change. Beyond this, it released specific policy documents on tobacco, obesity and alcohol. In the strategy on alcohol, the government committed to introducing a minimum unit price for alcohol. According to England's government (Buck et al., 2012) the behaviour change policy and practice need to be approached in a more integrated manner. This requires a more basic knowledge about so-far unanswered questions, such as how people give up multiple as opposed to single behaviours and what are the most cost-effective approaches.

The Portuguese National Program of Integrated Intervention about Health Determinants related to Lifestyle, only refers the single intervention on each of behavioral risk factors and does not mention the importance to address the clustering of behavioral risk factors (Portugal.MS.DGS, 2003). Population interventions targeting the major behavioral risk factors are just now beginning to be translated into public health interventions in Portugal, mainly through programs targeted against tobacco consumption. The promotion of healthy eating and regular physical activity are carried out under of the National Program to Promote Healthy Eating, while action against alcohol consumption has implemented on the National Plan to Reduce Alcohol Related Problems 2009-2012.

1.6.4 Implications for intervention

It has been suggested that eliminating health risk behaviours would prevent 80% of heart disease, stroke, T2D and 40% of cancers (Spring et al., 2012).

The incidence of diabetes was directly associated with lifestyle changes. Results from clinical trials have indicated that lifestyle changes, including dietary modification and increase in physical activity, can prevent T2D (Hu et al., 2007). When intervening upon one health behaviour, consequent changes in other health behaviours can be expected (Spring et al., 2012). However, with a multifactorial intervention study design it is not possible to point out a single factor that could be called the primary reason for the reduced risk of developing diabetes since all changes toward healthy lifestyle are important, and in different people different lifestyle changes have different impact (Hu et al., 2007).

One way out of the limited approach of selective interventions is to focus on more complex behavioral patterns rather than on isolated behaviours. In terms of planning comprehensive prevention programmes and interventions, it would therefore be useful to know the extent to which the most important behavioral risk factors aggregate in certain sectors of the population and whether typical risk groups can be identified on that basis (Schneider et al., 2009).

The prevalence, distribution and frequencies at which these behavioral clusters occur among various population groups may inform health improvement planning efforts across multiple settings, such as primary care clinics, work sites, health systems and public health agencies. Therefore, an increased understanding of the prevalence and clustering patterns of multiple lifestyle related health factors may support efforts to reduce incidence of disease, management of existing chronic disease and improve overall health outcomes (Pronk et al., 2004).

The cluster analysis method enables this kind of holist analysis and facilitates the identification of intervention-relevant target groups. However, most cluster analyses are limited to the correlation between two behavioral risk factors and do not consider multidimensional clusters (Schneider et al., 2009).

1.7 Self rated health

SRH is a single health measure based on subjective assessment of health status and it has been preferentially used in social science research (Yamada et al., 2012). SRH, usually presented as a single-item question, is a widely used and recognized measure of individual health status (Badawi et al., 2012; Reile et al., 2013) and it is based on the individual´s perception of his/her health status rated in a four or five-point scale (Darviri et al., 2011).

In the literature review performed no study has been identified in which the clustering of behavioral risk factors in a population with diabetes was evaluated with the aim of studying the association of these risk factors with self-rated health.

1.7.1 Self rated health as an indicator of health status

There are various health indicators, including mortality, morbidity, medical examination abnormalities, lifestyle habits, medical expenses, activities of daily living and quality of life. However, the combined use of multiple indicators sometimes makes it difficult to assess whose overall health (Yamada et al., 2012). SHR is one of the most common indicators of health in survey research and has also been recommended for health monitoring by both the WHO and the European Union Commission (Manderbacka et al., 1999). SRH has proven to be a reliable and valid predictor of subsequent mortality and morbidity indicating the biological basis of subjective health evaluation (Reile et al., 2013). Yamada et al. (2012) evaluated the usefulness of SRH as a comprehensive indicator of lifestyle related health status by examining the relationships between SRH and lifestyle habits, furthermore this indicator serves as an independent predictor of mortality, even after controlling for age, sex and other demographic variables (Yamada et al., 2012).

According to the Portuguese Society of Diabetology, the general assessment of the disease impact on the individual can use an approach based on the perception that the people have about their health status. The perception in relation to the quality of life has been considered as a co-adjunct of the traditional indicators in the assessment of health needs, considering that the complex physical, emotional and social interactions are implicated in the development of diseases and that they influence the results obtained with treatments. From 1999 to 2006 (Portugal. MS. INSA. INE, 2009), the proportion of individuals with a favourable (good or very good) assessment of their health status rose from 47% to 53%, however regional asymmetries are large. In every age group, females show a less positive self-perception of their health status.

1.7.2 Self rated health and behavioral risk factors

The association between age, gender and poor SRH is well documented (Unden et al., 2008) and it has been shown that women report poorer health than men. The findings show that men had higher odds than women to report better health of the SRH scale. Concerning age, previous findings confirm that ageing is linked with worse SRH. Individuals with good to excellent SRH were more likely married or living with a partner (Badawi et al., 2012). The results of this study suggested that divorced people reporting a positive SRH, when compared with married people. Low education has been related to poor SRH in numerous studies (Pikhart, 2002; Leinsalu, 2002). Education is a key component of socioeconomic status affecting people´s opportunities for obtaining a better job and higher living standard. It can also affect people´s lifestyle and health behaviour which might explain the importance of education for health over and above purely wealth-related factors. Although Martinez-Sanchez et al. (2002) who also reported that the associations between educational level and negative health were of a small magnitude. Mackenbach et al. (1994) found in their study that education was associated with both excellent and ill health. Low socioeconomic status (SES) in Foraker et al., 2011 assessed by education level and impaired health are well established

determinants of poor SRH (Foraker et al., 2011). Although the link between SES and health inequalities is far from doubt, mediators of this relationship still remain elusive. The concept of psychosocial mediators, directly or indirectly linked to stress, seems most promising, since maladaptive stress responses entail a broader range of behavioral and physical changes leading to unhealthy lifestyle patterns and physical “wear and tear”, all jeopardizing heath (McEwen et al., 2010).

According to the last information from the Portuguese Society of Diabetology, Portugal has already a specific measure of quality of life for people with diabetes that is the SRH, it seems important to apply it nationally, as a measure to provide in detail what often escapes to the general measures. On the other hand, in our country there is no known measure of quality of life integrated in clinical process of each diabetic patient. In this context, in addition to biological parameters it is important the perception of the quality of life of people with diabetes.

1.8 Literature review

The literature review begins by addressing the etiopathophysiology, epidemiology and complications of T2D. Then, it is discussed the major behavioral risk factors of T2D, namely smoking, heavy drinking, unhealthy diet and physical inactivity. Following, the literature review was progressed to the indicators of unhealthy dietary pattern. Although the fourth Portuguese NHIS is still the only population based tool regularly producing nationally representative data on food consumption in Portugal, from the National Food Survey 1980/81, it does not provide quantitative diet information. This review is a fundamental support to develop a methodology to assess the dietary pattern of the Portuguese population, taking into consideration the international recommendations for a healthy diet, and consequently to study of clustering of behavioral risk factors in a Portuguese population with and without diabetes.

After, the literature review was continued to the SRH as an indicator of health status.

Our literature review was conducted in Medline and Web of knowledge library. Key terms included diabetes, diet, dietary patterns, survey, Latent Class Analysis (LCA), behaviours risk factors and specific behavioral (eg, smoking, heavy drinking, physical inactivity and unhealthy diet) and SRH. The papers included were searched between 2000 and 2014.

2. AIMS

According to the two research questions:

i) How are the behavioral risk factors clustered in the Portuguese population with and without diabetes?

ii) What is the association between the clustering of behavioral risk factors in the Portuguese population with diabetes and their SRH?

of this study general and specific objectives were defined. The main aim of this research was to explore the association between the clustering of major behavioral risk factors among Portuguese population with diabetes and their SRH from the fourth Portuguese NHIS.

The outcome variables for the behavioral risk factors as smoking, heavy drinking, physical inactivity have been defined based on the questions of the fourth Portuguese NHIS, whereas quantitative unhealthy diet information is not provided in the survey. Therefore, it was fundamental to develop a methodology to assess the dietary pattern of the Portuguese population, taking into consideration the international recommendations for an unhealthy diet (paper I). We developed this methodology with the main focus being:

• To identify indicators of an unhealthy / healthy dietary pattern based on the self reported information about eating habits from the fourth Portuguese NHIS;

• To identify subgroups of the population with and without diabetes mellitus with different dietary patterns.

Then, we investigated the clustering and variation across different socio-demographic groups of the major behavioral risk factors (smoking, heavy drinking, physical inactivity and unhealthy diet) in two groups of the Portuguese population, one with and one without diabetes (paper II). The main focus of this paper was:

• To explore the clustering of four major behavioral risk factors in the Portuguese population with and without diabetes. The focus is smoking, heavy drinking, physical inactivity and unhealthy diet, as these are the main behavioral risk factors (paper II);

• To examine the socio-demographic variation in the clustering of the four behavioral risk factors in order to identify the groups that are the most at risk (paper II);

Finally we explored the association between the behaviour risk factors patterns in the Portuguese population aged 15 years and older with diabetes and their SRH (paper III) with the main focus being:

• To investigate the association between the four behaviours risk factors in a Portuguese population aged 15 years and over with diabetes and their SRH;

• To identify the association of the patterns of behaviours risk factors with SRH in a nationally representative sample.

3. MATERIALS AND METHODS

3.1 Methodological phases

To answer of the research questions different methodological options were performed which will be discussed in the statistical analysis section.

i) How are the behavioral risk factors clustered in the Portuguese population with and without diabetes?

To address this research question we applied different strategies. First, we used the LCA to identify distinctive dietary patterns of the population with self-reported diabetes in paper I. Second, we applied the cluster analysis to identify the risk behavior clusters in the Portuguese population aged 15 years and over with and without diabetes (paper II). Finally, in both papers (I and II) we performed a binary logistic regression methods to obtain the Odds Ratios (OR) and their 95% Confidence Intervals (CI), thus we investigate the extent of the association between a categorical dependent variable and independent variables.

ii) What is the association between the clustering of behavioral risk factors in the Portuguese population with diabetes and their SRH?

To answer this research question as above we used the LCA to identify distinctive behavior patterns of the population with self-reported diabetes and we developed a binary logistic regression method to investigate the extent of

the association between a categorical dependent variable and independent variables.

3.2 Study design

This is a descriptive, observational, retrospective epidemiological study with a cross-sectional design and an analytical component, achieved through the analysis of database derived from the fourth Portuguese NHIS (Portugal.MS.INSA.INE, 2009). This is a general health survey with data collection through applying a questionnaire by direct interview coordinated by National Health Institute Doutor Ricardo Jorge.

According to Henekens et al. (1987) a cross-sectional study explores the relationship between disease (or other health related state) and other variables of interest as they exist in a defined population at a single point in time or over a short period of time.

This descriptive study used a cross-sectional design to examine the relationships between behavioral risk factors and positive SRH in a Portuguese population with diabetes. Only the frequency and simultaneous clustering of the lifestyle risk factors were reported and no causal claims were made. In our study the data only provide a snapshot of the behavioral risk factors among the population with diabetes.

Given the two research questions proposed about the association between behavioral risk factors and SRH in a Portuguese population with diabetes, it seems that the cross-sectional study is well suited.

We attached the fourth Portuguese NHIS used in this study.

3.3 Study population

The study population was the Portuguese population aged 15 years and older living in private households which was part of the fourth Portuguese NHIS conducted between February 2005 and February 2006. The population living in collective households and other non classical households was not included in the survey. The total dataset consisted of 41,193 respondents living at 15239 household addresses that were selected from the five Mainland NUTS regions and the two NUTS autonomous regions of the Azores and Madeira. Participants younger than 15 years (n=3417) and with missing data were excluded because the prevalence of T2D in individuals with less than 15 years is negligible (Portugal.MS.INSA.INE, 2009). According to WHO 15 years and older corresponding to the age at which all instruments and methods of inquiry are applicable in accordance with recommendations of international organizations (WHO, 2003). This is the population studied in paper I. A subgroup of the surveyed population in second trimester evaluated in papers II and III because the physical activity was only surveyed in this trimester. The sampling method was conducted from probabilistic samples of the Portuguese population, through interviews at home, using valid and stable instruments and methods. A description of the methodology of sample selection is published (Portugal.MS.INSA.INE, 2009).

The data were weighted to account the probability of households and individuals being selected to take part in the survey sample. Data from questionnaires of self-reported diabetic and non diabetic individuals, hereinafter referred to as diabetic/non diabetic, were then analyzed.

3.4 Operationalization of variables

The fourth Portuguese NHIS (2005/2006) included questions structured in several themes from which we defined the variables of this study. To achieve the goals of this study we studied variables for the following themes: socio-demographic characterization, health status, chronic disease, habits with respect to smoking, food and beverage consumption and physical activity.

3.4.1 Conceptual definition of variables

Sex, age, marital status, education level were the socio demographic characteristics we considered in this study by analogy with similar studies published in the literature.

Smoking, heavy drinking, physical inactivity and unhealthy diet were the behavioral risk factor variables used. Both socio demographic characteristics and behavioral risk factors were the independent variables. A SRH variable was used as health indicator and it was the dependent variable of the study.

Sex refers to the male or female phenotype.

Age refers to the number of completed years from the date of birth to the interview date.

Marital status at the time of interview. Marital status was used because having a partner acts as a source of social support that can buffer against adverse health effects (Buck et al., 2012).

Education highest level completed refers to the higher education level which was completed by the respondent at the interview date. This study used education level measure as complementary marker of socio-economic status, since it may capture, at least in part, different mechanisms influencing lifestyle behaviours. Education is likely to be linked to health behaviour. Education can reflect greater material wellbeing as it is likely to influence opportunities for job

and income. In turn, greater economic resources imply access to better food, safer environments and better housing, all related to healthier lifestyle choices. But education can also reflect an important range of non-economic characteristics such as cognitive skills, literacy, knowledge, prestige and control. Education therefore increases a person's ability to access and process information and prompts greater influence over one's life, leading to healthier lifestyles (Buck et al., 2012).

Consumption of tobacco measured the consumption of tobacco to the interview date. *Smoking* status was ascertained as non smokers, and those who answered "daily" or "occasionally", smokers. The definition follows the WHO recommendations (WHO, 2009b).

Consumption of alcoholic beverages measured the current consumption of drinks containing alcohol in their composition. *Heavy drinking* was defined as consuming an average of more than 2 drinks for men and 1 drink or more for women, per day (U.S. Centers for Disease Control and Prevention, 2013).

Physical inactivity measured inadequacy of total physical activity performed during business and leisure. This variable was defined as less than 30 minutes of moderate physical activity per day or the practice of less than 20 minutes of vigorous physical activity per day.

Unhealthy diet was assessed by unhealthy dietary pattern using current nutrition knowledge and LCA. With respect to unhealthy dietary pattern, it was reported dietary non diversity, non consumption of fruit and vegetables and number of main meals per day below three as an indicators of an unhealthy dietary (Costa et al., 2014c).

Self rated health was measured using a single item. Respondents rated their overall health on a scale with five possible response alternatives: 'very good', 'good', 'fair', 'bad' or 'very bad'. The answers were split into two SRH categories- positive (combining very good and good health) and negative (fair, bad and very bad health). A single question on SRH is a valid and widely used measurement in European and International studies (Abu-Omar et al., 2004; Bailis et al., 2003). It is an established indicator of general health status and all-cause early mortality (Parkes, 2006).

Data from the fourth Portuguese NHIS dataset was used to define variables in each paper.

3.4.2 Operational definition of variables

The operational definition of variables refers the names, codes and values of the original variables as they appear in the original database of the fourth Portuguese NHIS. In the case of composite variables constructed for the analysis of data for this work the names, codes and values of the new variable are listed.

Sex is a qualitative, nominal, binary variable and was used in its original form, not recoded, (male with code 1 and female with code 2).

Age in its original form (Q131_COD variable) is available with the values grouped in 19 categories coded with 1-19. In this work the original variable was recoded in another variable (Age_G) with 6 categories. Age was categorised into five year bands: 15–34, 35–44, 45–54, 55–64, 65-74 and 75 and over.

Marital status in its original form (Q14_COD variable) is available in the following 5 categories: single, married, married if legally separated of the people and goods, divorced and widower. We recoded this variable in another variable (marital status_G) with 4 categories. Marital status wa**s** categorised as single, married, divorced and widower.

Education highest level completed in its original form (Q16_COD variable) is available into 7 categories, however it was recoded in another variable (Education level) with the following categories: none, primary school, secondary school and high school.

Variables characterizing the behavioral risk factors were analyzed: Consumption of tobacco, Consumption of alcoholic beverages, Food and Physical activity. The presence of dangerous levels of each of these variables was assigned the code "1" and its absence the code "0". The missing values were coded with the code "9".

3.5 Statistical analysis

We will give a brief overview of the stages of data analysis as well as the statistical techniques that were used on the three scientific papers published. The stages of data analysis were the following:

- Description of the absolute frequency and percentage distribution of each of the socio-demographic characteristics, disaggregated by presence or absence of diabetes;
- Description of the frequency and percentage distribution of each of the unhealthy behavioral risk factors and number of risk behaviours, disaggregated by presence or absence of self-reported diabetes;
- Analysis of the statistical associations of the four behavioral risk factors taken in associations of pairs, among diabetic and non diabetic individuals;
- Analysis of the observed (O) and expected (E) frequencies for each of the four behavioral risk factors, as well as their possible combinations in diabetic and non diabetic individuals;
- Analysis of the statistical associations between socio-demographic characteristics and presence of two or more risk behavioral among diabetic and non diabetic individuals;
- Identification of the subgroups of the diabetic population with different behavioral risk factor patterns;
- Analysis of the statistical associations between the SRH and each of the explanatory variables (socio-demographic characteristics and behaviour risk factors);
- Analysis of the statistical associations between behaviour risk factors patterns in a population with diabetes and their SRH

We identified distinctive dietary patterns and distinctive behavior patterns of the population with self-reported diabetes in **paper I and III**, respectively, using the LCA. LCA is a statistical tool used to identify homogeneous, mutually exclusive groups (or classes) that exist within a heterogeneous population (Sotres-Alvarez et al., 2010). This LCA assumes that each observation is a member of one and only one of *T* latent (unobservable) classes and that local independence exists between the manifest variables. That is, conditional on latent class membership, the manifest variables are mutually independent of each other. This model can be expressed using (unconditional) probabilities of belonging to each latent class and conditional response probabilities as parameters (Vermunt et al., 2005). The chosen analysis begins by fitting the *T*=1 class baseline model (H_0), which specifies mutual independence among the variables. This process continues by fitting successive latent class models to the data, each time adding another dimension by incrementing the number of classes by 1, until the simplest model is found that provides an adequate fit (Vermunt et al., 2005). Of these competing latent class models, the selection of the best fitting model was subject to several statistical fit measures as well as theoretical and practical considerations (Biemer, 2011; Dunn et al., 2006; Langeheine et al., 1996; Laska et al., 2009; Yang, 2006). Four statistical fit measures were used for comparing across several plausible models: the Log-likelihood value, the Akaike's Information Criterion (AIC), Bayesian Information Criterion (BIC) and Bootstrap *p-value* measure.

In paper II chi-square tests for the null hypothesis of independence between the behavioral risk factors were performed. In this paper given the null frequency of clustering of four behavioral risk factors in a population, this class was aggregated to classes with "2" and 3 risk factors present concomitantly.

In paper II we applied the cluster analysis (Schuit et al., 2002; Galán et al., 2005) to identify the risk behavior clusters in the Portuguese population aged 15 years and over with and without diabetes.

The clustering of behavioral risk factors can be studied at different stages and using different methods. The determination of the behavioral risk factors simultaneously present in each individual allows to characterize the distribution of its prevalence stratified by demographic and social characteristics. For

example, the relationships between smoking and alcohol consumption, between smoking and diet, and between physical activity and other factors are well known. A wider-range of combinations in which a higher than expected frequency of 3 and 4-factor clustering has been observed has also been evaluated (Schuit et al., 2002; Galán et al., 2005; Drieskens et al., 2010). Other approach consists in comparison of the observed frequencies of the two or more risk factors present simultaneously in a population with the values that would be expected for this prevalence, considering that the risk factors distributions were independent. From this comparison results are obtained clusters in which the association between risk factors is potentially stronger. The expected proportion was calculated by multiplying the individual probabilities of each risk factor based on their occurrence in the study population for diabetic and non diabetic separately. The difference between the observed and expected (O/E) was calculated. The prevalence OR was used to calculate clustering of two risk factors, adjusted for sex, age, education level, and marital status (Schuit et al., 2002; Galán et al., 2005). The cluster analysis of behaviour risk factors with variables characterizing the state of health, namely SRH allows to find data which are used to estimate impact measures, namely the OR. This association measure generates important information aiming to reduce behaviour risk factors for the planning and programming interventions of public health geared towards effectiveness (WHO, 2009a).

In all papers the OR and their 95% CI were obtained by binary logistic regression models. This regression procedure is a useful tool to investigate the extent of the association between a categorical dependent variable and one or more independent variables (Kleinbaum et al., 2010).

In paper I the logistic regression model was performed between class membership as the dependent variable and socio demographic variables: sex, age, marital status and education level in the diabetic and non diabetic groups. We recoded the dependent variable into another variable which was recoded as 1=class 1 and 0=class 2 (reference category). We classified the diabetics and non diabetic individuals belonging to classes 1 and 2 as having an unhealthy dietary intake and healthy dietary intake, respectively. We used the Backward Stepwise method to interpret the magnitude of the associations between class

membership and socio demographic variables using adjusted OR and their corresponding 95% CI. **In paper II** a binary logistic regression was carried out with presence of a set of the behaviour risk factors as the dependent variable. We recoded this variable into another variable which was recoded as 1= has at least two behavioral risk factors and 0= has zero behavioral risk factors (reference category). The covariates were the socio demographic characteristics: sex, age, marital status and education level and we also use the Backward Stepwise method to select the most important variables and the corresponding adjusted OR and their corresponding 95% CI. We interpreted the magnitude of the association between the different socio demographic variables and the presence of the "worst" combination (at least two behavioral risk factors) in a Portuguese population aged 15 and old years with and without diabetes.

In paper III we developed a binary logistic regression between SRH as the variable dependent and covariates (socio demographic characteristics and behaviours risk factors). We recoded the dependent variable into another variable which was recoded as 1= positive SRH and 0= negative SRH (reference category). SRH was categorized as positive (very good or good) and negative (fair, bad or very bad). Using a similar methodology, the Backward Stepwise method was used to calculate the adjusted OR and their corresponding 95% CI. We explored the association between positive SRH and each of the explanatory variables (socio-demographic characteristics and behaviours risk factors) in a diabetic population aged 15 and old years.

For each one of the studied variables the absence or the presence of the characteristic was coded as "0" or "1", respectively.

The data were weighted in all articles to account the probability of households and individuals being selected to take part in the survey sample (UK. Food Standards Agency, 2010). In brief, the weighting factor corrected for known socio-demographic differences between the composition of the survey sample and that of the total population of the Portugal, in terms of socio-demographics characteristics (Portugal.MS.INSA.INE, 2009).

Statistical Package for Social Sciences (SPSS) (IBM SPSS Statistics 20) was used to conduct the statistical analysis in all articles. Latent Gold 4.5 (Statistical

Innovations Inc. Belmont, MA 02478) was used to perform the clustering and latent class models in papers I and III.

4. RESULTS

This work includes the following papers:

4.1 PAPER I

Costa E, Oliveira L, Gonçalves L, Dias CM (2014) Dietary patterns of the Portuguese population with and without self-reported diabetes: data from the fourth National Health Interview Survey. *International Journal of Health Sciences and Research* 4(12): 267-277. Indexed in Scopemed, DOAJ, Index Copernicus, Google Scholar, BOAI, SOROS, Scirus, NEWJOUR, Open J-Gate, ResearchBib, getCITED, Ulrich's Databases. Impact Factor: 3.5. ISSN: 2249-95771.

4.2 PAPER II

Costa E, Dias CM, Oliveira L, Gonçalves L. Clustering of behavioral risk factors in a Portuguese population: data from the National Health Interview Survey. *Journal of Behavioral Health* 3(4): 205-211. Indexed in ScopeMed, Index Scholar, Google Scholar and Akademik Dizin.

4.3 PAPER III

Costa E, Gonçalves L, Oliveira L, Dias CM. Positive self rated health in a Portuguese population with diabetes: association with socio-demographic characteristics and behaviour risk factors patterns. *International Journal of Health Sciences and Research* 4(12): 257-266. Indexed in Scopemed, DOAJ, Index Copernicus, Google Scholar, BOAI, SOROS, Scirus, NEWJOUR, Open J-Gate, ResearchBib, getCITED, Ulrich's Databases. Impact Factor: 3.5. ISSN: 2249-95771.

An oral communication with the theme “Dietary patterns of the Portuguese population with self-reported diabetes: data from the fourth National Health Interview Survey” was presented on the IV National Congress of Public Health. The abstract was published in the journal *Health by numbers* (2015) *3:1-108*. Also, an oral communication with the theme “Behaviour risk factors and self-rated health among Portuguese population with diabetes: data from the fourth National Health Interview Survey" was accepted on the International Congress Present and Future: Clinical, Social and Economic Reality in Diabetes.

International Journal of Health Sciences and Research
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Original Research Article

Dietary Patterns of the Portuguese Population with and Without Self-Reported Diabetes: Data from the Fourth National Health Interview Survey

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ABSTRACT

Introduction: Given that it is not known how the dietary recommendations are followed in the diabetic population in Portugal, the general purpose of this work was to compare the dietary pattern reported by the Portuguese population with and without self-reported diabetes by combining self reported information about eating habits.
Materials and methods: The study sample was derived from the fourth Portuguese National Health Interview Survey (n=41,193 respondents, aged 15 years and older living in private households). After excluding subjects with incomplete data, the study population comprised 2973 individuals with diabetes (1246 men; 1709 women) and 32244 individuals without diabetes (15536 men; 16708 women). Latent Class Analysis (LCA) statistical techniques were used to classify individuals in different groups.
Results: Two latent classes: unhealthy dietary pattern (class 1) and healthy dietary pattern (class 2) were identified for people with and without diabetes. The highest proportion of participants was classified into the class of unhealthy dietary patterns both in individuals with and without diabetes. Analysis of the diet of people with and without diabetes was made including the following covariates: sex, age, marital status and education level.
Conclusions: The magnitude of the association between class membership and some covariates yielded differences between diabetic and non diabetic groups. Taking into account the larger size of the class denoted by unhealthy dietary patterns, an important gap in dietary habits seems to emerge in this study and suggests that health promotion activities should be tailored to improve dietary patterns of both people with and without diabetes.
Key words: *Diabetes, diet, survey*

INTRODUCTION

Diabetes represents a major public health problem in Portugal with an estimated prevalence of 11.7 %. [(1)] Knowledge of diet and nutrition patterns of people with diabetes is thus important for improving

their control measures, and is even more relevant since the burden of other chronic non-communicable diseases is growing in Portugal. [2] An unbalanced diet is a main risk factor for several chronic diseases, including obesity, stroke, cancer and type 2 diabetes mellitus. [3] Diverse diets have been shown to protect against chronic diseases such as cancer, as well as being associated with prolonged longevity and improved health status. [4] Intake of fruits and vegetables has been associated with a lower risk of cardiovascular disease as well as a lower risk of many diet-related cancers and other chronic diseases prevailing highly in Western societies. [5] The nutrients essential to meet nutritional requirements are not all found in a single food item but come from a diet composed of a number of foods[4]. A measure of the nutritional quality of the diet may therefore be its diversity and numerous proposals have been put forward to determine the best adapted diet. [4,6]

Assessing dietary adequacy is essential in order to formulate nutrition recommendations with respect to nutrient intake and dietary habits. [6] Currently, the nutritional recommendations for patients with diabetes do not differ from those for normal individuals without diabetes with respect to prevention of major chronic diseases. [6,7] Thus, dietary recommendations for people with diabetes should not differ appreciably from recommendations for the entire family. [9] Patients with diabetes usually receive extensive information on food to become more familiar with portion sizes and help monitor their dietary intake in order to achieve glycemic control. [8] The results of SU.VI.MAX study [6] indicate that patients with diabetes may be aware of the importance of diet in the management of their disease, and that they try to modify their dietary habits.

Conventional dietary studies are time consuming and costly, and under certain conditions very difficult to conduct. There is therefore a need for simple, low-cost methods for the assessment of the nutritional quality of diets. [4] The portuguese 2005/2006 National Health Interview Survey [10] included questions on dietary habits reported over a 24 hour period. However, this general health survey does not provide quantitative data on the consumption of specific food groupings.

Composing a dietary pattern indicator involves choices of the variables to be included and their scoring. [11] Most available indicators of dietary pattern include variables that represent current nutrition guidelines or recommendations, [11] namely the Diet Diversity Score (DDS) that reflects diet quality. The DDS is defined as the number of food groups consumed by each person, [4] and is not based on amounts or frequencies. This score takes into account only if the respondent consumed or not certain groups of foods during the reference period. This indicator reflects diet quality and is a simple tool that can be used for comparing groups within the population and to trace changes in diet variation and diet quality over time. [12] Also, a high DDS will reflect a consumption of foods from several of the food groups, and such a diet may therefore also have a higher nutritional quality. [4] It is possible to predict the nutritional adequacy of the diet by counting food groups in a DDS. [4]

Recently, alternative statistical analysis methods such as latent class analysis (LCA) have begun to be used in dietary research namely for identifying classes of individuals with comparable profiles. [13] When food intake is dichotomized, LCA is a technique suitable to combine dietary information from several food records or population subgroups for a food or food group of interest. [14] In LCA, individuals are assumed to belong to one of K mutually exclusive classes but for which

class membership is unknown. [15] LCA provides a new way to describe "usual" dietary patterns and to estimate the number and size of subgroups that display different food consumption patterns. [14]

In summary, the present study aimed to: (1) Identify indicators of an unhealthy / healthy dietary pattern based on self reported information about eating habits from the 2005/2006 Portuguese National Health Interview Survey, (2) Identify subgroups of the population with and without self-reported diabetes mellitus with different dietary patterns.

MATERIALS AND METHODS

Study population

The study sample was the Portuguese population aged 15 years and older living in private households which was part of the fourth Portuguese National Health Interview Survey [10] conducted between February 2005 and February 2006. The population living in collective households and other non classical households was not included in the survey. The total dataset consisted of 41,193 respondents that were selected from the five Mainland NUTS regions and the two NUTS autonomous regions of the Azores and Madeira. Participants younger than 15 years (n=3417) and with missing data were excluded because the prevalence of diabetes in individuals with less than 15 years is negligible. [10] The original sample is a probabilistic complex sample based on the results of population Census. [10] Data from questionnaires of individuals with and without self-reported diabetes hereinafter referred to as individuals with and without diabetes, were then analyzed. Informed consent from participants was obtained.

Definition of variables

Diabetes was measured using a single item. People were asked *"You have or had diabetes?"* People answering with two possible response alternatives: "yes" or "no".

Socio-demographic variables. Sex, age, marital status and level of education were included in this study (see Table 2).

Age in its original form is available with the values grouped in 19 categories. In this work the original variable was recoded in another variable with 6 categories. Age was categorised into five year bands: 15–34, 35–44, 45–54, 55–64, 65-74 and 75 and over.

Marital status. People were asked "What is your marital status? People answering with five possible response alternatives: "single", "married", "married if legally separated of people and goods", "divorced" and "windower". We recoded this variable in another variable with 4 categories: single, married, divorced and widower.

Education level. People were asked "Which is the highest education level you attend or attended? People answering with seven possible response alternatives: "none", "primary school- 1st cycle", "primary school- 2nd cycle", "primary school- 3rd cycle", "secondary school", "post-secondary school", "high school-bachelor", "high school- degree", "high school- master's degree", "high school-PhD", however it was recoded in another variable with the following categories: none, primary school, secondary school and high school.

Dietary pattern variables

The variables of the fourth National Health Interview Survey which reflect general dietary patterns were evaluated on this study as measures of dietary quality to define unhealthy dietary pattern indicators taking into account the current recommendations for a healthy diet. [16] The questionnaire included questions in which respondents were asked:" How many main meals usually you take each day?" In

addition, participants were asked: "Yesterday what did you eat in the main meals?" followed by a list of 11 food items. The answer options were "yes", "no", "not know".

To identify the indicators of an unhealthy dietary pattern based on the self reported information about eating habits from the 2005/2006 Portuguese National Health Interview Survey, we defined the following dietary pattern variables: i) dietary diversity, ii) consumption of fruit and vegetables and iii) number of main meals per day. The scoring system summarized in Table 1 was developed covering the different variables of dietary quality as follows: **1.** *Dietary diversity score:* Food items from three main meals reported over a 24 hour period. The score included 6 groups: Potato, cereal and cereal products; Pulses; Fruit; Milk and dairy products; Meat, fish and eggs and Vegetables, according to international recommendations [(11)] and in accordance to the Portuguese food guide. [(16)] The maximum score was 6, one point was given for each group consumed during the reporting period. Thus, dietary non diversity was present if the number of food groups, according to the food wheel, [(16)] consumed in the three main meals was less than 6. The sweets group was not considered in this score. **2**. *Consumption of fruit and vegetables score:* The score included 2 groups: Fruit and Vegetables, according to the food wheel. [(16)] The maximum score was 2, one point was given for each group consumed. Consumption of fruit and vegetables scoring 0 reflects an unhealthy dietary pattern. [(7)] **3**. *Number of main meals per day score*: The score situated between 1 and 9, one point was given for each meal, and according to the international recommendations [(11)] a score less than 3 indicates an unhealthy dietary pattern.

Unhealthy Dietary Pattern Indicators

Three unhealthy dietary pattern indicators were established: i) dietary non diversity, ii) non consumption of fruit and vegetables and iii) number of main meals per day bellow three. To define these indicators, we first derived variables from the above questions, secondly a scoring system was recorded to dichotomize the variables and therefore the indicators were created. The scoring for each variable was based on indices of overall diet quality [(17)] and the nutritional recommendations of public health organizations for making adequate food choices.

Description of LCA model selection

We applied LCA to identify dietary patterns of the Portuguese population with and without diabetes. In LCA individuals are assumed to belong to one of K mutually exclusive classes but for which class membership is unknown, and through a statistical model the latent class explains the associations among the observed variables. LCA is useful to study unobserved heterogeneity characterized by several unidentified groups that behave differently.

To study the underlying structure of these data, a series of LCA models were fit and examined. The optimal number of clusters can be determined in a variety of ways and no definitive method of determining the optimal number of clusters in a LCA exists. [(18)]

The literature [(19)] has shown that higher values of the log likelihood test statistic suggest better model fit. In addition, the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) are commonly used for LCA assessment. Parametric bootstrapping methods have also been used successfully. [(20)] When data might be sparse, for example, when there are a large number of variables or categories compared with the number of observations, the chi-squared distribution should not be used to determine the *p-value*, and bootstrap

p-values are recommended instead. [21] The optimal number of clusters is where the bootstrap *p-value* becomes non significant at the desired significance level. [18] A significant Bootstrap *p-value* ($p<0.001$) suggests that the model with one fewer class should be rejected in favour of the estimated model. [19] The results from this analysis have been shown to discriminate between groups of subjects and to associate with lifestyle factors.

Statistical analyses

Descriptive statistics was used to characterize the socio-demographic aspects of the population with and without diabetes. Subjects with incomplete data were excluded.

To find mutually exclusive groupings we used LCA. The LC Cluster procedure was used to estimate model parameters [22] for both groups (e.g. people with and without diabetes) separately. To select the appropriate number of classes, a two class model was first fitted to the data and compared to fitted models with an increasing number of latent classes (e.g., two versus three classes). Of these competing latent class models, the selection of the best fitting model was subject to several statistical fit measures as well as theoretical and practical considerations. [18-20,23,24]

Four statistical fit measures were used for comparing across several plausible models: the Log-likelihood value, the Akaike's Information Criterion (AIC), Bayesian Information Criterion (BIC) and Bootstrap *p-value* measure. Higher values of the log likelihood test statistic and the lowest values for the information criterion indices (AIC and BIC) suggest better model fit.

Furthermore, latent class models may accommodate covariates, [21] including sex, age, marital status and education level. All these factors are considered as possible influences of population heterogeneity on their diet quality.

To ensure that the maximum likelihood solution was appropriately identified within these models, 2500 Estimation-Maximization (EM) iterations and 500 Newton-Raphson iterations of each type of model (i.e., from two to three classes) were run using randomly generated seed values. Bootstrap *p values* based on 500 replications were determined to assess the model fit based on the Log-likelihood statistic. Latent Gold software uses both the EM and Newton-Raphson algorithms to estimate model parameters. [22] A problem that sometimes occurs in latent class analysis is that a local maximum, rather than the global best solution, is obtained. [19] To avoid this situation, 1,000 repeated runs were performed from random start values.

In addition, a subsequent analysis was performed using a binary logistic regression considering class 1 (unhealthy dietary patterns) and class 2 (healthy dietary patterns) as a dependent variable, in order to interpret the magnitude of the associations between class membership and the covariates: sex, age, marital status and education level using the odds ratio (OR) and their corresponding 95% confidence intervals (CI).

Statistical Package for Social Sciences (IBM SPSS Statistics 20) and Latent Gold 4.5 (Statistical Innovations Inc. Belmont, MA 02478) were used to conduct the statistical analysis.

RESULTS

The descriptive statistics of socio-demographics characteristics (sex, age, marital status and education level) of the individuals with and without diabetes are presented in Table 2. The study comprised of 2973 individuals with diabetes (1246 men; 1709 women) and 32244 individuals

without diabetes (15536 men; 16708 women).

Table 1. Dietary pattern variables

Variables	Scoring
Dietary diversity	Score <1 from each of six food groups
Consumption of fruit and vegetables	neither
Number of main meals per day	below 3

Table 2. Socio-demographics characteristics of individuals with and without diabetes

Socio-demographics characteristics		Diabetics (*n 2973*)		Non diabetics (*n 32244*)	
		n	%	n	%
Sex	Men	1246	42.5	15536	48.2
	Women	1709	57.5	16708	51.8
Age	15-34	88	2.9	9689	30.0
	35-44	184	6.2	5542	17.2
	45-54	426	14.3	5410	16.8
	55-64	737	24.8	4450	13.8
	65-74	925	31.1	4123	12.8
	≥ 75	613	20.6	3030	9.4
Marital status	Single	199	6.7	8944	27.7
	Married	2094	70.4	19425	60.2
	Divorced	82	2.8	1163	3.6
	Widower	598	20.1	2712	8.4
Education level	None	885	29.8	4394	13.6
	Primary	1892	63.7	19841	61.6
	Secondary	92	3.1	4462	13.8
	Higher	103	3.5	3530	11.0

Regarding the population with diabetes, 86.0 % of individuals have dietary non diversity, 7.0 % do not consume any fruit and vegetables and 5.7 % eat less than 3 meals a day. Concerning people without diabetes, 84.8 % have dietary non diversity, 8.8 % do not consume any fruit and vegetables and 8.1 % eat less than 3 meals a day. Differences in diet intake between diabetic and non diabetic groups were statistically significant ($p<0.001$), in terms of non consumption of any fruit and vegetables and the number of main meals per day below 3 (results not shown).

Table 3 shows the model fit statistics derived from LCA for the two to three latent class models for both groups (people with and without diabetes) when unhealthy dietary pattern indicators and the covariates sex, age, marital status and education level were included in the model. In selecting the final model, we examined the Log likelihood statistics, Bootstrap *p-value*, BIC and AIC criteria across models (see Table 3).

Results from LCA suggest a three classes solution based on Akaike and Bayesian Information Criterion´s and log-likelihood. However, when we test the two class model against three class model, according to the bootstrap p-values, assuming 1% and 5% significance levels, the plausibility of the two class model was pointed out. Thus, based on the principle of parsimony and the meaning of those two classes, this two class model seems to be more appellative.

The response probabilities for each of the three indicators associated with dietary patterns are presented for each of the latent classes in Table 4. These probabilities can be used to characterize the two latent classes. The two distinct latent classes of unhealthy dietary pattern indicators for individuals with and without diabetes who were aged over 15 years are as follows:

Class 1- This group reported the highest probabilities of unhealthy dietary pattern indicators from 0.78 (dietary non diversity) to 0.87 (non consumption of fruit and vegetables) for people with diabetes and 0.68 (dietary non diversity) to 0.81 (non consumption of fruit and vegetables) for people without diabetes. This class represented 81.9% and 73.9% of the individuals with and without diabetes, respectively. This class could be considered the less favorable diet.

Class 2- This class reported the lowest probabilities for the all unhealthy dietary pattern indicators, ranging from 0.13 (non consumption of fruit and vegetables) to 0.22 (dietary non diversity) for the people with diabetes and from 0.19 (non consumption of fruit and vegetables) to 0.32 (dietary non diversity) for the people without diabetes.

This class comprised 18.1% and 26.1% of the individuals with and without diabetes, respectively. This class could be considered the most favorable diet.

Based on this characterization we can classify the individuals with and without diabetes belonging to classes 1 and 2 as having an unhealthy dietary intake and healthy dietary intake, respectively. Overall, the unhealthy dietary pattern indicators were similar between people with and without diabetes for the two classes identified (see Table 4). However, there were dissimilarities in class percentages among the two groups.

Table 3. Criterion to assess model fit for LCA models with covariates

Number of classes	Diabetics		Non diabetics	
	2 class	3 class	2 class	3 class
LL	-581225.95	-567743.72	-8258470.52	-8233679.88
AIC_{LL}	1162489.91	1135557.45	16516979.04	16467429.76
BIC_{LL}	1162707.05	1135957.45	16517243.26	16467916.48
N par	19	35	19	35
Bootstrap *p-value*	-	0.082	-	0.050

LL, log-likelihood; AIC, Akaike's Information Criterion; BIC, Bayes' Information Criterion; N par, Number of parameters

Table 4. Latent class analysis with covariates among people with and without diabetes: probability of latent class membership (last row) and item response probabilities within each of the two classes

Unhealthy dietary indicators	Diabetics		Non diabetics	
	Class 1	Class 2	Class 1	Class 2
1. Dietary non diversity	0.781	0.219	0.684	0.316
2. Non consumption of fruit and vegetables	0.873	0.127	0.808	0.192
3. Number of main meals /day < 3	0.837	0.163	0.769	0.231
Probability of latent class membership	0.819	0.181	0.739	0.261

Class 1, unhealthy dietary pattern; Class 2, healthy dietary pattern

DISCUSSION

The present study was carried out in order to investigate the dietary patterns in a group of individuals with and without self-reported diabetes and based on the identification of unhealthy dietary pattern indicators, using the data from the 2005/2006 National Health Interview Survey. The use of dietary patterns to capture the overall dietary habits of the population has received much attention in recent years. [(26)]

Table 5. Estimated Odds Ratios (OR) and 95 % Confidence Intervals (CI) between classes with covariates across diabetic and non diabetic groups

	Diabetics class 1 *v.* class 2		Non diabetics class 1 *v.* class 2	
	OR adj	95% CI	OR adj	95% CI
Sex				
Men	1.056	1.035, 1.077	1.767	1.759, 1.775
Age (Ref. ≥ 75)				
15-34	14.729	14.082, 15.407	1.466	1.452, 1.482
35-44	3.806	3.653, 3.965	1.223	1.210, 1.235
45-54	2.862	2.761, 2.966	1.139	1.127, 1.151
55-64	0.665	0.642, 0.689	0.606	0.599, 0.613
65-74	1.050	1.020, 1.080	0.668	0.661, 0.674
Marital status (Ref.Widower)				
Single	0.426	0.407, 0.447	1.098	1.086, 1.110
Married	0.713	0.693, 0.732	0.598	0.592, 0.604
Divorced	13.954	13.369, 14.565	1.205	1.189, 1.222
Education level (Ref. Higher)				
None	5.379	5.103, 5.669	5.532	5.474, 5.591
Primary	1.527	1.454, 1.602	2.883	2.860, 2.907
Secondary	0.273	0.247, 0.301	1.120	1.109, 1.132

Class 1,unhealthy dietary pattern; class 2, healthy dietary pattern. Binary logistic latent class regression

The selection of variables (dietary diversity, consumption of fruits and vegetables and number of main meals per day) used to built the proposed indicators of unhealthy dietary pattern was based on literature suggesting risks associated with these eating behaviors. Individuals who do not consume one food from each of six food groups, namely individuals who do not consume fruit and vegetables, are more likely not to have a healthy dietary pattern. The nutritional quality of the diet improves with increasing number of food items and food groups. [(12)] We identified in our study three unhealthy dietary pattern indicators: dietary non diversity, non consumption of fruit and vegetables and number of main meals per day bellow three. In a British cross-sectional study, [(27)] a dietary pattern characterized by a high consumption of fruit

and vegetables was inversely associated with type 2 diabetes risk.

We identified two distinct groups of individuals (unobserved groups) in people with and without diabetes using different dietary patterns based on the LCA. The LCA procedure using simultaneously the three unhealthy dietary patterns indicators is relevant because this procedure uses more information than the comparison of the variables one by one in identifying dietary patterns.

Since nutritional recommendations for patients with diabetes do not differ from those for normal individuals without diabetes [(6)] and considering that the food consumption patterns reflect dietary preferences, it could be expected that the identified patterns do not differ between people with and without diabetes and this was confirmed by our results showing a homogeneous dietary behaviour among diabetic and non diabetic groups. However, the percentage of the individuals with diabetes with poor dietary pattern is higher than in individuals without diabetes (81.9% *v.* 73.9%).

The highest proportion of participants was classified into the class denoted by unhealthy dietary patterns (class 1) for both groups. Overall, the two classes of the individuals with and without diabetes identified by LCA were predicted by sex, age, marital status and education level.

Our study identified subgroups of the population with and without diabetes with different dietary patterns. Thus, these findings suggest that men with and without diabetes were more likely to belong to the unhealthy dietary pattern (class 1) *v.* healthy dietary pattern (class 2) than women, which corresponds with the previous findings from literature. Men with diabetes were more than one time more likely to be in class 1 *v.* class 2 than women were, whereas men without diabetes were nearly two times more likely than women to be in class 1 rather than class 2. For example, Beardsworth *et al.* [(28)] showed that women were more likely to make dietary changes in line with recommendations and women had higher levels of health knowledge than men.

For diabetic and non diabetic groups, people who had 15-34 years were more likely to belong to the unhealthy dietary pattern (class 1) *v.* healthy dietary pattern (class 2), which is consistent with Waijers & Feskens [(5)] findings that older age were generally predictors of better diet scores. Between 15 and 64 years old, when the age is increased, the odds ratio in class 1 *v.* class 2 decreased in the diabetic and non diabetic groups, however the association was more significant in the diabetic group. For example, individuals with diabetes with 15-34 years old were almost fifteen times more likely to be in class 1 *v.* class 2 than people's aged over 74 years old. Individuals without diabetes of the same age were one and half times more likely to be in class 1 *v.* class 2 than individuals aged over 75 years old.

The magnitude of the association between class 1 membership and marital status is higher in the divorced than single people in diabetic and non diabetic groups when compared to widowers. This finding is consistent with Schafer *et al* [(29)] who provided clear evidence of the importance of family food interactions for the diet quality of marital partners, and demonstrated that transition from married to unmarried status is associated with an increase in negative health behaviour. In our study the marital status was more significantly associated with class membership in the people with diabetes than in the people without diabetes. For example, the odds ratio in class 1 *v.* class 2 were almost fourteen times higher and less than two times for divorced, in the people with and without diabetes, respectively, than for widower people.

Both people with and without diabetes with the lowest level of education were also more likely to be in the least favourable dietary group, which is consistent with Worsley *et al.* [30] that found that higher educated people were associated with the regular consumption of a wider variety of foods. In our study people with no education level were nearly five times more likely to be in class 1 than class 2 either for individuals with and without diabetes, when compared with people who reported a higher level of education. As diabetic and non diabetic people´s education level increased, the odds ratio in class 1 *v*. class 2 decreased.

Limitations

Although the Portuguese National Interview Survey is still the only population based toll regularly producing nationally representative data on food consumption in Portugal it does not provide quantitative diet information. The National Survey only use a few questions about food intake reported over a 24 h hour period, however some authors consider that detailed information, characteristic of nutrition surveys, is not always necessary when the objective is to characterize and classify the population into big categories of food habits. [31,32] The new National Health Interview Survey is ongoing and to date, there is no other system in Portugal to monitor and investigate dietary patterns at the national level. A limitation of self-reported dietary assessment methods is under-reporting or over-reporting, [33] and this may have introduced bias to the data. As the questions from the survey do not allow to directly measure and quantify the diet, the Portuguese National Health Interview Survey gave insufficient information on food consumption. The approach was based on the characterization of a dietary pattern using current nutrition knowledge and LCA statistical techniques. New strategies to make surveys more efficient and timely such as quantitative information on food consumed are needed to simplify the dietary assessment of the Portuguese population based on international recommendations.

CONCLUSIONS

An unhealthy dietary pattern was identified including dietary non diversity, non consumption of fruit and vegetables and number of main meals per day below three as indicators. LCA identified two major groups of the population with and without self-reported diabetes mellitus with different dietary patterns. The study showed that large percentages of participants, people with and without diabetes (81.9% *v.* 73.9%) have an unhealthy dietary pattern (Table 4). The dietary patterns were differentially associated mainly with sex, age, education level and marital status values among individuals with and without diabetes. The classification of individuals into these groups may help and contribute to future analysis where the information about individuals with an unhealthy dietary pattern is important. To our knowledge, there are no studies that have evaluated dietary patterns derived by latent class analysis in a Portuguese population with and without diabetes.

The foregoing analysis offers some insights into the dietary habits of the Portuguese population and provides useful information about dietary behaviour that was hitherto unavailable nationally. From a public health perspective, results from dietary pattern analysis can be easily translated and incorporated into dietary recommendations for the public. [26]

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Conflicts of interest

The authors declare that there are no conflicts of interest.

REFERENCES

1. Correira LG, Boavida JM. First diabetes prevalence study in Portugal: PREVADIAB study. Diabet Med 2010; 27: 879-881.
2. Zimmet P, Alberti KGMM, Shaw J. Global and societal implications of the diabetes epidemic. Nature 2001; 414: 782-787.
3. Thiele S, Mensink GBM, Beitz R. Determinants of diet quality. Public Health Nutr 2004; **7:** 29-37.
4. Hatloy A, Torheim LE, Oshaug A. Food variety- a good indicator of nutricional adequacy of the diet? A case study from an urban area in Mali, West Africa. Eur J Clin Nutr 1998; 52: 891-898.
5. Waijers PMCM, Feskens EJM. Indexes of overall diet quality: a review of the literature. Bilthoven: Ministry of Health Welfare and Sports, 2005.
6. Gauthier-Chelle K, Mennen L, Arnault N, *et al*. Comparison of the diet of self-declared diabetics with non-diabetics patients in the SU.VI.MAX study: did the diabetics modify their nutritional behaviour? Diabetes Metab. 2004; 30: 535-542.
7. U.S. Department of Agriculture. U.S. Department of Health and Human Services.Dietary Guidelines for Americans 2010. 7th edition. Washington, DC: U.S. Government Printing Office, 2010.
8. Yannakoulia M. Eating Behaviour among Type 2 Diabetic Patients: A Poorly Recognized Aspect in a Poorly Controlled Disease. Rev Diabetic Stud 2006*;* 3: 11-16.
9. The Diabetes and Nutrition Study Group (DNSG) of the European Association for the Study of Diabetes. Recommendations for the nutritional management of patients with diabetes mellitus Eur J Clin Nutr 2000; 54: 353-355.
10. National Health Institute Doutor Ricardo Jorge. National Statistical Institute. 2005/2006 Portuguese National Health Interview Survey. Lisbon: INSA, 2009.
11. Waijers P, Feskens E, Ocké M. A critical review of predefined diet quality scores. Br J Nutr 2007; 97: 219-231.
12. Torheim LE, Barikmo I, Parr CL, *et al.* Validation of food variety as an indicator of diet quality assessed with a food frequency questionnaire for Western Mali. Eur J Clin Nutr 2003; 57: 1283-1291.
13. Wang WC, Worsley A, Hodgson V. Classification of main meal patterns – a latent class approach. Br J Nutr 2013; 109: 1-12.
14. Patterson BH, Dayton CM, Graubard BI. Latent Class Analysis of Complex Sample Survey Data: Application to Dietary Data. JASA 2002; 97: 721-741.
15. Sotres-Alvarez D, Herring AH, Siega-Riz AM. Latent Class Analysis is Useful to Classify Pregnant Women into Dietary Patterns. J Nutr 2010*;* 2253-2259.
16. Rodrigues SSP, Franchini B, Graça P, *et al.* A New Food Guide for the Portuguese Population: Development and Technical Considerations. JNEB 2006*;* 38: 189-195.
17. Kant AK. Indexes of overall diet quality: a review. J. Am. Diet Assoc 1996; 96: 785-791.
18. Vermunt JK, Magidson J. Latent Gold® 4.0 User´s Guide. Belmont, MA: Statistical Innovations Inc., 2005.
19. Dunn KM, Jordan K, Croft PR. Characterizing the Course of Low Back Pain: A Latent Class Analysis. Am J Epidemiol 2006; 163: 754-761.
20. Langeheine R, Pannekoek J, Van de Pol F. Bootstrapping goodness-of-fit measures in categorical data analysis. Sociol Methods Res 1996; 24: 492-516.
21. Laska MN, Pasch KE, Lust K, *et al.* Latent Class Analysis of Lifestyle Characteristics and Health Risk Behaviors among College Youth. Prev Sci. 2009; 10: 376-386.
22. Yang CC. Evaluating latent class analysis models in qualitative phenotype

identification. Comput Stat Data Anal 2006; 50: 1090-1104.
23. Lanza ST, Collins LM, Lemmon DR, *et al*. PROC LCA: a SAS procedure for latent class analysis. Struct Eq Model 2007; 14: 671–694.
24. Biemer P. Latent Class Analysis of Survey Error. New Jersey: Wiley, 2011.
25. Food Standards Agency. Appendix B Weighting the NDNS core sample. Aberdeen: Food Standard Agency, 2010.
26. Liu E, McKeown NM, Newby PK *et al.* Cross-sectional association of dietary patterns with insulin-resistant phenotypes among adults without diabetes in the Framingham Offspring Study. Br J Nutr 2009*;* 102: 576-583.
27. Montonen J, Knekt P, Harkanen T *et al*. Dietary Patterns and the Incidence of Type 2 Diabetes. Am J Epidemiol 2005; 161: 219-227.
28. Beardsworth A, Bryman A, Keil T *et al.* Women, men and food: the significance of gender for nutritional attitudes and choices. Br Food J. 2002; 104: 470–491.
29. Schafer RB, Schafer E, Dunbar M *et al.* Marital food interaction and dietary behavior. Soc Sci Med 1999; 48: 787–796.
30. Worsley A, Blasche R, Ball K *et al*. The relationship between education and food consumption in the 1995 Australian National Nutrition Survey. Public Health Nutr 2004; 7: 649–663.
31. Rohrmann S, Klein S. Development and validation of a short food list to assess the intake of total fat, saturated, mono-unsaturated, polyunsaturated fatty acids and cholesterol. European Journal of Public Health 2003; 13: 262–268.
32. Kim DJ, Holowaty EJ. Brief, validated survey instruments for the measurement of fruit and vegetable intakes in adults: a review. Preventive Medicine 2003; 36: 440– 447.
33. Heitmann BL, Lissner L, Osler M. Do we eat less fat, or just report so? Int J Obes Relat Metab Disord. 2000*;* 24: 435–42.

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GESDAV

Clustering of behavioral risk factors in the Portuguese population: Data from National Health Interview Survey

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ABSTRACT

Background: Given that behavior-related risk factors cluster together in individuals and populations it is important to study their patterns to inform Public Health interventions and decisions aimed at controlling disease and promoting health. This study examines the clustering and variation across different socio-demographic groups of four major behavioral risk factors (smoking, heavy drinking, physical inactivity, and unhealthy diet) in two groups of the Portuguese adult population, one with and one without diabetes. **Methods:** The study sample was derived from the 2005/2006 National Health Interview Survey for Portugal. Clustering was evaluated by comparing the observed and expected frequency of the different possible combinations of the four risk factors. A binary multiple logistic regression model was fitted to examine the socio-demographic variation in the clustering of the four risk factors. **Results:** Among the Portuguese population (584,286 individuals surveyed), 8.9% of diabetics and 19.5% of non-diabetics accumulated two or three behavioral risk factors. Behavioral risk factors are explored considering all possible multiple combinations (k = 16). The most frequent combination was smoking and unhealthy diet. **Conclusions:** These findings suggest that the likelihood of individuals having two or more risk behaviors simultaneously was greater in men 35-44 years old and lower education level both in diabetics and non-diabetics.

KEY WORDS: Behavioral risk factors, diabetes, diet, drinking, smoking

INTRODUCTION

Changes in human behavior and lifestyle over the last century resulted in a dramatic increase of the incidence of diabetes worldwide [1]. Increases in the prevalence of smoking, heavy drinking, an unhealthy diet, and physical inactivity are the principal modifiable causes of non-communicable morbidity and mortality [2-4].

There is vast epidemiological evidence that indicates these four behavioral risk factors contribute to the development of chronic conditions, such as different types of cancer, Type-2 diabetes, and cardiovascular disease [3-5]. While much is known about each one of the behavioral-related risk factors, less is known about the prevalence and clustering of multiple risk factors in representative samples of the population [2,6].

Smoking, excessive alcohol use, an unhealthy diet, and physical inactivity have been shown to be more prevalent among men, younger age groups, economically inactives, single status, and those who have a lower socio-economic status and lower level of education [7,8]. There is some evidence that combinations of behavioral risk factors has important implications on people's health [3,9], suggesting that the clustering of lifestyle risk factors are more harmful than can be expected from the individual effects alone.

Insight into clustering of lifestyle risk factors is important because this can be used in developing prevention strategies by targeting groups in the population with a simultaneous presence of lifestyle-related unhealthy habits [4]. We defined clustering as an observed proportion of a combination of risk factors in excess of its expected proportion [10]. In this context, it is important to know if we can discriminate subgroups with elevated clustering so that prevention can be better targeted and organized [10]. Hence, the study of the clustering of risk factors has important implications on both disease risk and the development of preventive interventions targeting the combination of risk factors rather than individual risk factors [3].

In the present study the prevalence and clustering of lifestyle risk factors were investigated in the Portuguese population, diabetics and non-diabetics, aged 15 years and over, in total and in subgroups based on the sex, age, marital status and education level.

The aim of the present study was to explore the clustering of four major behavioral risk factors in two subgroups of the Portuguese population: With diabetes and without diabetes. The focus is physical inactivity, unhealthy diet, excessive alcohol, and smoking, as these are the main modifiable causes of ill health in the developed world [11,12]. In addition, this study explores the socio-demographic variation in the clustering of the four behavioral risk factors in order to identify the groups that are the most at risk.

METHODS

Study Population

The study population was the Portuguese population aged 15 years and over living in private households through a representative sample associated to Portuguese National Health Interview Survey [13]conducted between February 2005 and February 2006. The sampling frame was selected from the nationally representative sample of all housing units in the five administrative regions (North, Centre, Lisbon region, Alentejo and Algarve)and the two autonomous regions of Azores and Madeira. The population living in collective households and other non-classical households (e.g. hospitals, prisons, military barracks, or retirement houses)were not included. Data on participants younger than 15 years were excluded from this analysis because of the low prevalence of diabetes in this sub-group [13]. Cases with missing data were also removed from the analysis. This study evaluated the population surveyed in the second trimester of data collection because physical activity of respondents was only assessed in this trimester.

The data collection process was conducted using probabilistic sampling methods of the Portuguese population, through interviews at home, using valid and stable instruments and procedures. A description of the methodology of sample selection is published [13]. Self-reported data from diabetic and non-diabetic individuals, hereinafter referred to as diabetic/non-diabetic, were then analyzed.

Measures

Behavioral Risk Factors

Four behavioral risk factors were studied [Table 1]. People were asked "Do you smoke?." People answering "no" were considered nonsmokers, and those who answered "daily" or "occasionally," smokers.

Definition of alcohol consumption was based on the centers for disease control and prevention definition of heavy drinking as consuming an average of more than two drinks for men and one drink or more for women, per day [14]. A standard drink was that containing 10 g of alcohol, which in Portugal is a glass of beer, a glass of wine or a measure of distilled alcohol beverage [15]. Those respondents who stated they drunk during the previous week were asked questions about the average number of glasses of alcoholic beverages (including wine, beer, brandy, spirits, whisky/gin/vodka)drunk per day and the mean volume of each serving (for each type of alcoholic beverage)was assessed using visual aids. Daily alcohol consumption was assessed by average number of servings per day × mean volume of each serving × mean% alcohol (12% for wine, 5% for beer, 20% for liquor and 40% for spirits)× 0.8 (alcohol density)for each type of alcoholic beverage [16]. Total alcohol consumption in the day was assessed by summing up the individual amounts for each type of alcoholic beverage.

Table 1: Socio-demographic characteristics and unhealthy behavior risk factors of the Portuguese population aged 15 years and over with diabetes and without diabetes[a]

Variable	Diabetics (*n*=274,293)		Non-diabetics (*n*=309,993)	
	n[b]	%[c]	n[b]	%[c]
Sex				
Men	107,078	39.0	132,516	42.7
Women	167,215	61.0	177,478	57.3
Age				
15-34	14,229	5.2	113,306	36.6
35-44	17,349	6.3	49,499	16.0
45-54	32,715	11.9	45,695	14.7
55-64	77,562	28.3	47,626	15.4
65-74	74,229	27.1	27,941	9.0
≥75	58,208	21.2	25,926	8.4
Marital status				
Single	18,657	6.8	97,473	31.4
Married	188,276	68.6	174,183	56.2
Divorced	10,152	3.7	11,937	3.9
Widower	57,208	20.9	26,400	8.5
Education level				
None	76,952	28.1	41,114	13.3
Primary	178,078	64.9	181,998	58.7
Secondary	9,614	3.5	42,860	13.8
Higher	9,649	3.5	44,022	14.2
Risk behaviors				
Smoking	19,329	7.0	63,350	20.5
Heavy drinking	986	0.4	1,618	0.5
Physical inactivity	8,109	19.6	7,243	10,1
Unhealthy diet	249,502	91.8	274,082	89.2
Number of risk behaviors				
None	20,841	7.6	25,170	8.1
One	229,141	83.5	225,468	72.7
Two	24,149	8.8	57,239	18.5
Three	162	0.1	2,116	0.7

[a]2005/2006 Portuguese National Health Interview Survey, Trimestre 2, [b]Weighted analysis expressed in terms of absolute frequency of Portuguese population aged 15 years and over, [c]Weighted analysis expressed in terms of percentage of Portuguese population aged 15 years and over, [d]The study population does not have the simultaneous presence of four behavioral risk factors

The third behavioral risk factor was physical inactivity. The respondents were asked about which was the time usually spent in 1 day during the previous week doing vigorous physical activities (e.g. heavy work, aerobics, running, swimming, or anything else that causes large increases in breathing or heart rate)and moderate physical activities (e.g. bicycling, vacuuming, gardening). Respondents were classified as being moderately physically active if they reported engaging in moderate intensity activity at least 30 min/day or vigorously physically active if they reported engaging in vigorous-intensity activity at least 20 min/day [17,18]. Hence, the practice of <30 min of moderate physical activity per day or the practice of <20 minutes of vigorous physical activity per day was considered a risk factor.

The fourth behavioral risk factor focused on the unhealthy diet. The unhealthy diet was assessed in a previous study [19] that explored the unhealthy dietary pattern using current nutrition knowledge and latent class analysis. With respect to unhealthy dietary pattern, we reported dietary nondiversity, nonconsumption of fruit and vegetables, and number of main meals per day below three as indicators of an unhealthy diet.

Socio-demographic Variables

The socio-demographic characteristics: Sex, age, marital status, and level of education were included in this study [Table 1]. Age was categorized as 15-34 years, 35-44 years, 45-54 years, 55-64 years, 65-74 years, and ³75 years intervals; marital status was classified into single, married, divorced, and widowed. Level of education was divided into four categories: None, primary, secondary, and higher.

Statistical Analyses

We described the observed frequency of single behavioral risk factors coded as a binary variable (yes = 1; no = 0). Then the observed frequency of multiple behavioral risk factors: Smoking, heavy drinking, physical inactivity, and unhealthy diet were estimated using a risk factor index approach where individual risk factor scores were summed to yield a multiple risk factor index ranging from zero (no risk behavior)to four (four simultaneous risk behavioral) based on the overall factors. To evaluate the most frequent risk behavioral combinations, the ratio between the observed and expected (O/E)frequency was calculated for each possible combination, as described by Schuit *et al.* (2002). The expected frequency was calculated by multiplying the individual probabilities of each risk factor, assuming risk factors occur independently in the population under study [10]. Clustering occurs when the observed prevalence of a combination of factors exceeds the expected prevalence for this combination. O/E ratios higher than 1 are indicative of clustering [4]. All analyses were conducted for diabetics and non-diabetics separately.

In the first analysis [Table 3]the crude odds ratio (OR) was calculated using the clustering of two behaviors in the presence of another risk behavioral. Reference category is those not exposed to the first risk factor. For example, an OR of 6.492 indicates that subjects displaying a given behavioral (e.g., unhealthy diet)are 6.5 times more likely to display another behavior (e.g. physical inactivity)when compared to those not exposed to the first behavior (unhealthy diet).

A binary multiple logistic regression model was carried out with presence of a set of the behavior risk factors as the dependent variable: A respondent has at least two behavioral risk factors as compared to the reference group of having zero behavior risk factor and the socio-demographic characteristics as covariates: Sex, age, marital status and education level, in order to obtain adjusted OR_{adj} and their corresponding 95% confidence intervals. In addition, we interpreted the magnitude of the association between the different socio-demographic variables and the presence of the "worst" combinations (at least two behavior risk factors).

Table 2: Risk behavior clusters of the Portuguese population aged 15 years and over with diabetes and without diabetes

Number of risk factors	Presence of risk behaviors					Diabetics (*n*=274,293)			Non-diabetics (*n*=309,993)		
	Smoking	Heavy drinking	Physical inactivity	Unhealthy diet		O (%)	E (%)[a]	O/E (Approx.)	O (%)	E (%)[a]	O/E (Approx.)
4	+	+	+	+		0.0	0.0	0.0	0.0	0.0	0.0
					Total	0.0	0.0	0.0	0.0	0.0	0.0
3	+	+	+	−		0.0	0.0	0.0	0.0	0.0	0.0
	+	+	−	+		0.1	0.0	4.8	0.0	0.1	0.0
	+	−	+	+		0.0	1.3	0.0	0.3	1.8	0.2
	−	+	+	+		0.0	0.1	0.0	0.0	0.0	0.0
					Total	0.1	1.3	0.1	0.3	2.0	0.2
2	+	+	−	−		0.0	0.0	0.0	0.2	0.0	20.1
	+	−	+	−		0.0	0.1	0.0	0.3	0.2	1.3
	+	−	−	+		5.8	5.1	1.1	11.5	16.4	0.7
	−	+	+	−		0.0	0.0	0.0	0.0	0.0	0.0
	−	+	−	+		0.1	0.3	0.4	0.0	0.3	0.0
	−	−	+	+		10.9	16.7	0.7	5.4	7.1	0.8
					Total	16.8	22.2	0.8	17.4	24.0	0.7
1	+	−	−	−		1.1	0.5	2.4	1.7	2.0	0.9
	−	+	−	−		0.2	0.0	8.2	0.1	0.0	2.6
	−	−	+	−		0.1	1.5	0.1	0.2	0.9	0.2
	−	−	−	+		82.9	68.4	1.2(*)	76.4	63.4	1.2(*)
					Total	84.3	70.3	1.2	78.4	66.3	1.2
0	−	−	−	−		6.7	6.1	1.1	7.0	7.7	0.9
					Total	6.7	6.1	1.1	7.0	7.7	0.9

Notes: Prevalence was computed using weighted methods and expressed in terms of percentage of Portuguese population aged 15 years and over, +: Presence of unhealthy behavior. −: Absence of unhealthy behavior. O: observed prevalence of combination of risk factors; E: expected prevalence of combination of risk factors; O/E: observed/expected, [a]E (%): Some of them are very small but not zero, as suggested in same cases, (*) For example in both diabetics and non-diabetics the proportion of diabetics and non-diabetics having one risk behavior (unhealthy diet) was higher than can be expected on the basis of the individual frequencies (O/E ratio in diabetics: 1.2, non-diabetics: 1.2). This indicates a 20% increase in subjects with an unhealthy diet over that which would be expected if the risk factors were independent

Table 3: OR and 95% CI of combination of two behavioral risk factors versus first factor in diabetics and non-diabetics

	Diabetics (*n*=274,293)			Non-diabetics (*n*=309,993)		
	%	OR[a]	95% CI	%	OR[a]	95% CI
Risk factor combination						
Smoking×heavy drinking	17.9	2.911	2.472-3.429	61.8	10.040	9.273-10.869
Smoking×unhealthy diet	6.5	0.418	0.402-0.436	13.3	0.515	0.504-0.526
Smoking×physical inactivity	0.0	Na	Na	23.0	1.356	1.301-1.413
Heavy drinking×unhealthy diet	0.1	0.048	0.042-0.054	0.1	0.022	0.020-0.024
Heavy drinking×physical inactivity	0.0	Na	Na	0.0	Na	Na
Unhealthy diet×physical inactivity	98.0	6.492	5.540-7.608	84.3	1.032	0.985-1.082

[a]Reference category is those not exposed to the first risk factor, Na: Not applicable, OR: Odds ratios, CI: Confidence intervals

The data analysis procedures were carried out using the SPSS Statistical Software Package version 21.0 (IBM SPSS Statistics 20), considering the sampling weight.

RESULTS

Table 1 shows the socio-demographic characteristics of the sample and the frequency of each individual and studied unhealthy behavior in each group: Diabetics and non-diabetics. About 14% of the studied Portuguese population aged 15 years and over smoked, 0.4% drank heavily an average in the last week, 2.6% were physical inactive, and 89.6% had an unhealthy diet. While non-diabetics were more likely to have smoking as risk behavior, diabetics were more likely to have physical inactivity and unhealthy diet.

Analysis comparing diabetics and non-diabetics in the study population showed statistically significant differences between the two groups with respect to sex, age, marital status, and education level. The unhealthy diet was the most frequent single behavior, with a significant difference between diabetic and non-diabetic individuals (91.8% vs. 89.2%, $p < 0.001$).

Table 2 presents the occurrence of the 16 possible combinations of the four unhealthy behaviors investigated. For the combination of two unhealthy behaviors, we noted an important difference between the combination of smoking and heavy drinking in non-diabetics (O/E=20.1). For the combination of three unhealthy behaviors, the combination that presented the highest potential for aggregation was smoking, heavy drinking, and unhealthy diet (O/E=4.8)for diabetics. Non-diabetics have a low aggregation

of three behavior factors. The cluster of three or two unhealthy behaviors presented the greatest difference between O/E proportions in diabetics and non-diabetics, respectively.

Clustering for pairs of unhealthy behaviors is presented in Table 3. It is clear that the risk of lacking a healthy diet is markedly higher for individuals who have physical inactivity, among diabetics (OR=6.5)and the risk of smoking is higher for individuals who have an excessive alcohol consumption, among non-diabetics (OR=10.0). Furthermore, diabetics and non-diabetics individuals who have a healthy diet are more likely to smoke, as well as to drink.

Table 4 presents the results of the binary logistic model with a dichotomization of behavior risk factors (zero vs. two or more) as the dependent variable. This table shows the association between socio-demographic variables and presence of at least two behavior factors (prevalence=8.9% diabetics; prevalence=19.2% non-diabetics). Men aged 35-44 years with secondary education level were more likely to have at least two risk factors, in both diabetics and non-diabetic individuals, taking into account the reference categories as indicated in Table 4.

DISCUSSION

In the present study, we investigated the frequency and clustering of the four most important behavioral risk factors for the development and control of diabetes, namely smoking, heavy drinking, physical inactivity and unhealthy diet. Our results show that approximately 14% of the Portuguese population aged 15 years and over had at least two behavioral risk factors simultaneously.

In recent years, a number of studies reported clustering of different behavioral risk factors [2,4,8]. However, it is difficult to compare these studies as they focus on different combinations of behavioral risk factors, use different cut-off points, concern different study populations [3,7,10].

Table 4: Association between socio-demographic variables and presence of two or more risk behavioral factors, among diabetic and non-diabetic individuals

Socio-demographic variables	Diabetics		Non-diabetics	
	OR_{adj}	95% CI[a]	OR_{adj}	95% CI[a]
Sex (Women)				
Men	2.98	2.83-3.14	2.58	2.51-2.65
Age (≥75)				
15-24	0.88	0.78-0.98	7.26	6.84-7.70
25-34	1.62	1.47-1.79	8.06	7.60-8.55
35-44	12.92	11.66-14.32	12.81	12.01-13.67
45-54	4.22	3.87-4.60	5.68	5.37-6.02
55-64	1.66	1.54-1.79	5.95	5.61-6.31
Marital status (Married)				
Single	1.35	1.21-1.51	0.62	0.59-0.64
Divorced	0.45	0.41-0.48	1.33	1.26-1.39
Widower	0.50	0.46-0.54	0.39	0.37-0.41
Education level (Higher)				
None	10.02	8.92-11.26	0.64	0.60-0.68
Primary	8.84	7.95-9.83	0.72	0.68-0.75
Secondary	89.26	76.28-104.45	1.51	1.43-1.59

Notes: The reference groups of predictor variables are given in parentheses, [a]Results from binary multiple logistic regression for all socio-demographic variables

In this study more people than expected had a combination of three behavioral risk factors including smoking, heavy drinking and unhealthy diet. This finding is consistent with the studies carried out in The Nederlands [10]and England [2].

The prevalence order of risk behaviors in our study with the diabetic population is similar to the findings from the Morgen study [10]conducted with Dutch individuals aged 20-65 years which showed that the most common health risk behavior was poor diet, followed by low levels of physical activity, smoking, and heavy drinking. A population-based survey derived from the 2003 Health Survey for England [2]showed the same pattern.

The results of this study show that certain combinations were less prevalent than could have been expected on the basis of the occurrence of the individual behavioral risk factors alone. These mainly involved unhealthy diet, together with smoking and/or physical inactivity, suggesting that people who have a healthy diet are more likely to smoke and/or to practice physical exercise. It has been hypothesized that this may be due to people smoking after participating in organized sports [10].

This study also found that the clustering of sets of behavioral risk factors was more marked for diabetics than for non-diabetics, particularly between physical inactivity and unhealthy diet. This finding suggests that more diabetics than expected had none of the four behaviors risk factors.

In a study conducted in Brazil [20]the combination of simultaneous risk factors for chronic noncommunicable diseases, with at least two factors present, was 59.4% of the respondents and the most frequent pattern was the simultaneity of inadequate diet and physical inactivity (30.6%).

In addition, having the specific combination of smoking and unhealthy diet was clustered more strongly for non-diabetics than for diabetics. As there is no clear explanation for these results, the differences between diabetics and non-diabetics clustering should be more closely scrutinized.

Our results show that there are specific groups within the adult Portuguese population with diabetes and without diabetes that have an overall risky lifestyle. The results suggested that multiple risk factors were more prevalent among men who had 35-44 years and secondary education level. Men, in general, were more likely to report risk factors than women. Researchers who have addressed gender differences reported that socioeconomic and cultural factors can influence these behaviors [21].

The literature [10]report that the relationship between marital status and health could be related to a protective effect on the health status by the social and economic support between married people. In our study we found that single diabetic individuals and divorced non-diabetic individuals are more

likely to present at least two risk behaviors simultaneously than married diabetic and non-diabetic individuals, respectively.

Lower levels of education were also strongly associated with the presence of two or more risk factors in diabetics. This social gradient was also observed in studies about the simultaneity of risk factors in England [2], Holland [10]and the United States [22].

The present study has certain limitations, which should be considered. It should be mentioned that the common practice of dichotomizing health behavior variables may have implications for the findings [23]. Furthermore, this study relied on to self-reports of the different risk behaviors, which may be subject to social desirable answering, and self-reported presence or absence of diabetes. This is a cross-sectional study and only the frequency, and simultaneous clustering of the lifestyle risk factors was reported and no causal claims were made. We would also add that this study was conducted 8-9 years ago since this is the most recent public use data set available. To date, there is no other system regularly producing nationally representative data to monitor and investigate the behavioral risk factors in the Portuguese population. The new National Health Interview Survey is ongoing.

Our results may have important implications in terms of health policy and practice given that the high prevalence of multiple diabetes risk factors underscores the importance of interventions aimed at their reduction. Given that behavioral risk factors such as those investigated in the present study are potentially modifiable, identifying subgroups that are at higher risk of simultaneously displaying multiple factors is of extreme importance if we wish to reduce propensity of the diabetes.

One of the strengths of the present study is that it investigates clusters of diabetes risk factors, in contrast to most other studies, which focus on isolated behaviors. It found that approximately 9% of the diabetic and 19% of the non-diabetic individuals, respectively, have multiple risks and identified groups that are generally more at risk. Multiple behavior interventions may not only have a much greater impact on public health than single behavior interventions [24], they may also be more effective and efficient at achieving which goals as well [25].

CONCLUSIONS

Three major findings can be highlighted. First, the occurrence of the studied risk behaviors in the population is high: 92.1% of the Portuguese population aged 15 years and over reported at least one risk factor for diabetes. Second, among diabetics, the behavior pattern that indicated a greater increase than that expected at random was the simultaneous occurrence of the three risk factors (smoking, heavy drinking and unhealthy diet). Among nondiabetic individuals the behavior pattern that indicated a greater increase than expected was the simultaneous occurrence of the two risk factors (smoking and heavy drinking). Finally, the most vulnerable groups to the simultaneous occurrence of two or more risk behaviors for diabetes were identified: Men who have 35-44 years, who have secondary education and single or divorced depending diabetic or non-diabetic individuals.

The tendency for risk factors to aggregate has important implications for health promotion, thus, information on subgroups with elevated clustering will help in planning future preventive strategies.

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REFERENCES

1. Zimmet P, Alberti KG, Shaw J. Global and societal implications of the diabetes epidemic. Nature 2001;414:782-7.
2. Poortinga W. The prevalence and clustering of four major lifestyle risk factors in an English adult population. Prev Med 2007;44:124-8.
3. Moreno-Gómez C, Romaguera-Bosch D, Tauler-Riera P, Bennasar-Veny M, Pericas-Beltran J, Martinez-Andreu S, et al. Clustering of lifestyle factors in Spanish university students: the relationship between smoking, alcohol consumption, physical activity and diet quality. Public Health Nutr 2012;15:2131-9.
4. Galán I, Rodríguez-Artalejo F, Tobías A, Díez-Gañán L, Gandarillas A, Zorrilla B. Clustering of behavior-related risk factors and its association with subjective health. Gac Sanit 2005;19:370-8.
5. World Health Organization. Global Health Risks: Mortality and Burden of Disease Attributable to Selected Major Risks. Geneva: World Health Organization; 2009.
6. Matias Dias C, Briz T. Distribuição conjunta de determinantes de saúde relacionados com comportamentos na população portuguesa. Observações Bol Epidemiol INSA 2012;1:4-5.
7. Pronk NP, Anderson LH, Crain AL, Martinson BC, O'Connor PJ, Sherwood NE, et al. Meeting recommendations for multiple healthy lifestyle factors. Prevalence, clustering, and predictors among adolescent, adult, and senior health plan members. Am J Prev Med 2004;27:25-33.
8. Chiolero A, Wietlisbach V, Ruffieux C, Paccaud F, Cornuz J. Clustering of risk behaviors with cigarette consumption: A population-based survey. Prev Med 2006;42:348-53.
9. Slattery ML, Potter JD. Physical activity and colon cancer: confounding or interaction? Med Sci Sports Exerc 2002;34:913-9.
10. Schuit AJ, van Loon AJ, Tijhuis M, Ocké M. Clustering of lifestyle risk factors in a general adult population. Prev Med 2002;35:219-24.
11. Word Health Organization. The Word Health Report: Reducing Risks, Promoting Healthy Life. Geneva: World Health Organization; 2002.
12. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. JAMA 2004;291:1238-45.
13. National Health Institute Doutor Ricardo Jorge. National Statistical Institute. 2005/2006 Portuguese National Health Interview Survey. Lisbon: INSA; 2009.
14. Centers for Disease Control and Prevention. Alcohol and Public Health. Atlanta, GA: Department of Health and Human Services; 2013.
15. Aguiar P, Neto D, Lambaz R, Chick J, Ferrinho P. Prognostic factors during outpatient treatment for alcohol dependence: cohort study with 6 months of treatment follow-up. Alcohol Alcohol 2012;47:702-10.
16. Marques-Vidal P, Dias CM. Trends and Portugal: Results from the national health surveys 1995 to 1996 and 1998 to 1999. Alcohol Clin Exp Res 2005;29:89-97.
17. Centers for Disease Control and Prevention. UK Physical Activity Guidelines. Atlanta, GA: Department of Health and Human Services; 2011.
18. World Health Organization. Global Recommendations on Physical Activity for Health. Geneva: World Health Organization; 2010.
19. Costa E, Oliveira L, Gonçalves L, Dias CM. Dietary patterns of the Portuguese population with and without self-reported diabetes: Data from the fourth National Health Interview Survey. Br J Nutr (unpublished article, under review process).

20. Silva DA, Peres KG, Boing AF, González-Chica DA, Peres MA. Clustering of risk behaviors for chronic noncommunicable diseases: a population-based study in southern Brazil. Prev Med 2013;56:20-4.
21. Fornari C, Donfrancesco C, Riva MA, Palmieri L, Panico S, Vanuzzo D, et al. Social status and cardiovascular disease: a Mediterranean case. Results from the Italian Progetto CUORE cohort study. BMC Public Health 2010;10:574.
22. Fine LJ, Philogene GS, Gramling R, Coups EJ, Sinha S. Prevalence of multiple chronic disease risk factors 2001 National Health Interview Survey. Am J Prev Med 2004;27:18-24.
23. MacCallum RC, Zhang S, Preacher KJ, Rucker DD. On the practice of dichotomization of quantitative variables. Psychol Methods 2002;7:19-40.
24. Nigg CR, Allegrante JP, Ory M. Theory-comparison and multiple-behavior research: common themes advancing health behavior research. Health Educ Res 2002;17:670-9.
25. Atkins D, Clancy C. Multiple risk factors interventions. Are we up to the challenge? Am J Prev Med 2004;27:102-3.

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Original Research Article

Positive Self Rated Health in a Portuguese Population with Diabetes: Association with Socio-Demographic Characteristics and Behaviour Risk Factors Patterns

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ABSTRACT

Introduction: Self-rated health (SRH) is a health measure related to mortality, healthcare services utilization and quality of life. Given that behaviour related risk factors do not occur in isolation, rather they cluster together it is important to examine their patterns in a population with diabetes to inform a more holistic approach in both health promotion and illness prevention strategies. This study explores the association between the patterns of behaviour risk factors in a Portuguese population aged 15 years and over with diabetes and their SRH.
Methods: The study sample was derived from 2005/2006 Portuguese National Health Interview Survey. Associations with SHR were assessed using binary logistic regression model. SRH was categorized as positive (very good or good) and negative (fair, bad or very bad). Latent Class Analysis (LCA) was used to classify individuals in groups of behavioural risk factors patterns.
Results: Among the population with diabetes aged ≥ 15 years (226,068 valid cases), 11% reports positive SRH and 89% reports negative SRH. Men gender, younger age, higher level of education in contrast with lower education level´s, divorced and widower marital statuses in contrast with married were associated with positive SRH in the multiple logistic regression model. Physical activity and healthy diet were associated with positive SRH, after adjusting for socio demographics characteristics. Three behavioural risk factors patterns were identified: Physically inactive (83.3%), Smokers (11.2%) and Heavy drinkers (5.5%).
Conclusion: The perception of health status is essential for better planning in health, thus these findings have implications for policy makers to develop specific programmes aimed at improving public health.

Key words: Behavioural risk factors; Diabetes; Self rated health; Smoking; Alcohol

INTRODUCTION

Self-rated health (SRH) is a significant predictor of morbidity, mortality and the utilization of health services in current and preventative care [(1)] and it is based on the individual´s perception of his/her health status rated in a four or five-point scale. [(2)] It has been reported that diabetes is a cause of death that show a strong association with SRH. [(3)] SHR is one of the most common indicators of health in survey research and it has been recommended for health monitoring by both the World Health Organisation (WHO) and the European Union Commission. [(4)] Several determinants of SRH have been recognized such as demographic, socioeconomic, behavioural, psychosocial and disease related factors. [(2)] Currently, lifestyle health related habits such as smoking, excessive alcohol use, unhealthy diet and physical inactivity are gaining a growing attention in the international literature. [(5,6)] In general, individuals who follow a proactive lifestyle behavior report higher perceived health than those who do not. [(7)] The holistic approach to health recommended by WHO is focused on prevention, considering a set of modifiable factors in an integrated way. [(8)] Thus, the inspection of the clustering of behaviour risk factors is important to support a more holistic approach to health in both health promotion and illness prevention strategies. [(8)]

This study aimed to explore the association between the patterns of behaviour risk factors in a Portuguese population aged 15 years and over with diabetes *mellitus* and their SRH. The present study investigates the association of the patterns of behaviour risk factors with SRH, in contrast to most other studies, which focus on isolated behaviours.

MATERIALS AND METHODS

Study population

This cross sectional study is based on information collected from 2005/2006 Portuguese National Health Interview Survey. The study population comprised the Portuguese population aged 15 years and over with self-reported diabetes living in private households. This study evaluated the population surveyed in the second trimester because physical activity of respondents was only assessed in this trimester. Participants with less than 15 years and with missing data were excluded because the prevalence of diabetes in individuals with less than 15 years is negligible. [(9)] Sample size was 274,296 individuals, representative at national level, which is the weighted sample to account the probability of households and individuals being selected to take part in the survey sample. The sampling method was conducted from probabilistic samples of the Portuguese population, through interviews at home, using valid and stable instruments and methods. A description of the methodology of sample selection is published. [(9)] The population living in collective households and other non classical households (e.g. hospitals, prisons, military barracks or retirement houses) was not included in the survey. The sampling frame was selected from the nationally representative sample of all housing units in the five administrative regions (North, Centre, Lisbon region, Alentejo and Algarve) and the two autonomous regions of Azores and Madeira. The inclusion/ exclusion criteria include the target population units chosen among census lists. Within each parish is selected a sample of households in which is collected information about all residing individuals.Data from questionnaires of self-reported diabetic individuals, hereinafter referred to as diabetic, were then analysed. Informed consent from participants was obtained.

Measures

Socio-demographic variables. Sex, age, marital status and level of education were included in this study (see Table 1). Age was divided into six categories: 15–34, 35–44, 45–54, 55–64, 65–74 and ≥75); marital status was classified into single, married, divorced and widower; level of education was divided into four groups: none, primary, secondary and higher.

Smoking. People were asked "Do you smoke?". People answering "no" were considered non smokers, and those who answered "daily" or "occasionally", smokers.

Heavy drinking. Heavy drinking was defined as consuming an average of more than 2 drinks for men and 1 drink or more for women, per day. [(10)] A standard drink was that containing 10 g of alcohol, which in Portugal is a glass of beer, a glass of wine or a measure of distilled alcohol beverage. [(11)] Those respondents who stated they drunk during the previous week were asked questions about the average number of glasses of alcoholic beverages (including wine, beer, brandy, spirits, whisky/gin/vodka) drunk per day and the mean volume of each serving (for each type of alcoholic beverage) was assessed using visual aids. Daily alcohol consumption was assessed by average number of servings per day × mean volume of each serving × mean % alcohol (12% for wine, 5% for beer, 20% for liquor and 40% for spirits) × 0.8 (alcohol density) for each type of alcoholic beverage. [(12)] Total alcohol consumption in the day was assessed by summing up the individual amounts for each type of alcoholic beverage.

Physical inactivity. The respondents were asked about which was the time usually spent in one day during the previous week doing vigorous physical activities (e.g. heavy work, aerobics, running, swimming, or anything else that causes large increases in breathing or heart rate) and moderate physical activities (e.g. bicycling, vacuuming, gardening). Respondents were classified as being moderately physically active if they reported engaging in moderate intensity activity at least 30 minutes per day or vigorously physically active if they reported engaging in vigorous intensity activity at least 20 minutes per day. [(13)] So, the practice of less than 30 minutes of moderate physical activity per day or the practice of less than 20 minutes of vigorous physical activity per day was considered a risk factor. [(13)]

Unhealthy diet. The unhealthy diet was assessed in a previous study [(14)] that explored the unhealthy dietary pattern using current nutrition knowledge and latent class analysis. With respect to unhealthy dietary pattern, we reported dietary non diversity, non consumption of fruit and vegetables and number of main meals per day below three as indicators of an unhealthy dietary.

Self rated health. SRH was measured using a single item. Respondents rated their overall health on a scale with five possible response alternatives: 'very good', 'good', 'fair', 'bad' or 'very bad'. The answers were split into two SRH categories- positive (combining very good and good health) and negative (fair, bad and very bad health).

Statistical Analysis

We analysed the association between behaviour risk factors in a Portuguese population aged 15 years and over with diabetes and their SRH (Table 2). Before building the binary logistic regression model, an association analysis was performed between the SRH and each of the explanatory variables (socio-demographic characteristics and behaviour risk factors) using chi-square statistics (results not shown).

To identify the subgroups of the diabetic population (274,293 valid cases) with different behavioural risk factor patterns we used the LCA (see Table 3). To

select the appropriate number of classes, a two class model was first fitted to the data and compared to fitted models with an increasing number of latent classes (Table 4). This methodology was addressed by the authors in Costa *et al.* [(14)] For further details see the manuscripts published in the literature. [(15-20)]

Naming of classes is a subjective process and the classes were named in a way which best represented the most notable findings in the data. It is argued that while naming the classes makes presentation to the audience easier, [(21)] it is difficult to encapsulate the level of difference between classes with labels. Classes were assessed to determine the best possible name to represent the defining characteristics of individual classes.

Statistical Package for Social Sciences (IBM SPSS Statistics 20) and Latent Gold 4.5 (Statistical Innovations Inc. Belmont, MA 02478) were used to conduct the statistical analysis.

RESULTS

We identified the major behavioural risk factors (smoking, heavy drinking, physical inactivity and unhealthy diet) and SRH in a national sample with diabetes (see Table 1). Table 1 shows that over half of participants were women (61.0%). The majority of the sample individuals (76.6%) has aged 55 years and over. Over half of the individuals were married (68.6%) and had a primary education level (64.6%). About 14% of the study population smoked, 0.4% drank heavily on the least one occasion in the last week, 2.6% lacked physical activity and 89.6% had an unhealthy diet. Self rated health from fair to very bad accounted for the majority of the sample (73.3%).

Table 1. Socio-demographic characteristics, behaviours risk factors and self rated health of the Portuguese population aged 15 years and over with diabetes [a]

Variable	Diabetics(n = 274,293)	
	Frequency [b]	Percentage % [c]
Sex		
Men	107,078	39.0
Women	167,215	61.0
Age		
15-34	14,229	5.2
35-44	17,349	6.3
45-54	32,715	11.9
55-64	77,562	28.3
65-74	74,229	27.1
≥ 75	58,208	21.2
Marital status		
Single	18,657	6.8
Married	188,276	68.6
Divorced	10,152	3.7
Widower	57,208	20.9
Education level		
None	76,952	28.1
Primary	178,078	64.9
Secondary	9,614	3.5
Higher	9,649	3.5
Risk behaviours		
Smoking	19,329	7.0
Heavy drinking	986	0.4
Physical inactivity	8,109	3.0
Unhealthy diet	249,502	91.0
Self rated health		
Very good	2,742	1.0
Good	22,065	8.0
Fair	88,449	32.2
Bad	76,322	27.8
Very bad	36,490	13.3

[a] 2005/2006 Portuguese National Health Interview Survey, Trimester 2
[b] Weighted analysis expressed in terms of frequency of Portuguese population aged 15 years and over
[c] Weighted analysis expressed in terms of frequency of Portuguese population aged 15 years and over

Table 2 presents adjusted OR's from the binary logistic regression model between SRH and covariates that were found significant at the level of < 0.1 in the previous simple logistic model or Chi-square tests. Men had 2.65 higher odds for reporting positive SRH than women (95% CI: [2.55, 2.74]). When age is increased the OR decreased. Older age groups were less significantly associated with positive SRH than younger age groups. For example, individuals with 15-34 years old were almost seventeen times more likely to have a positive SRH than people aged over 74 years old. People with higher education

level reported a better SRH when compared with the people with lower education level´s.

Table 2. Multiple regression analysis of socio-demographic characteristics and behaviour risk factors with SHR as dependent variable

	Self rated health (positive *vs*. negative)	
	OR adj	95% CI
Sex		
Men	2.647	2.554, 2.744
Age (≥ 75)		
15-34	17.467	16.283, 18.738
35-44	13.073	12.244, 13.958
45-54	1.687	1.577, 1.805
55-64	1.288	1.222, 1.357
65-74	0.787	0.747, 0.829
Marital status (Married)		
Single*	0.957	0.899, 1.020
Divorced	5.007	4.716, 5.315
Widower	2.331	2.223, 2.443
Education level (Higher)		
None	0.617	0.571, 0.667
Primary*	0.968	0.901, 1.039
Secondary*	0.979	0.891, 1.075
Risk behaviours		
Smoking (Yes)	2.577	2.413, 2.752
Heavy drinking (Yes)	0.652	0.549, 0.775
Physical inactivity (Yes)	1.587	1.444, 1.744
Unhealthy diet (Yes)	1.298	1.242, 1.356

Note. The reference groups of predictor variables given in parentheses.
*p > 0.05 not significant in this multiple logistic regression analysis.

The OR associated to primary and secondary levels did not differ from high education level (p>0.05). Divorced people were nearly five times more likely to report a positive SRH when compared with married people and even the widowed people present a positive association with SRH, after adjusting for variables presented in Table 2. Binary logistic regression analysis revealed that alcohol consumption, physical activity and healthy diet were associated with positive SRH. The opposite effect was observed with smoking.

Table 3. Latent class analysis among diabetics: probability of latent class membership (last row) and item response probabilities within each of the three classes

Behavioural risk factors	Diabetics		
	Class 1	Class 2	Class 3
1. Smoking	0.000	1.000	0.000
2. Heavy drinking	0.000	0.284	0.716
3. Physical inactivity	1.000	0.000	0.000
4. Unhealthy diet	0.888	0.103	0.009
Probability of latent class membership	0.833	0.112	0.055

Class 1, Physically inactive class; Class 2, Smokers class; Class 3, Heavy drinkers class

Table 4. Criterion to assess model fit for LCA

	Diabetics		
Number of classes	2 class *vs* 1 class	3 class *vs* 2 class	4 class *vs* 3 class
LL	-186863.03	-186205.89	-186201.27
AIC_{LL}	373744.06	372439.78	372440.55
BIC_{LL}	373838.67	372586.95	372640.28
N par	9	14	19
Bootstrap *p-value*	0.0000	0.0060	0.2290

LL, log-likelihood; AIC, Akaike's Information Criterion; BIC, Bayes' Information Criterion; N par, Number of parameters

Table 4 shows the model fit statistics derived from LCA for the two to four latent class models when behavioural risk factors were included in the model. In selecting the final model, we examined the Log likelihood statistics, Bootstrap *p-value*, BIC and AIC criteria across models (see Table 4). The results from the LCA suggest a three classes solution based on Akaike and Bayesian Information Criterion´s and on the bootstrap p-values, assuming 1% and 5% significance levels. Also, when we test the three class model against four class model, according to the bootstrap p-values, assuming 1% and 5% significance levels, the plausibility of the three class model was point out. Thus, based on the principle of parsimony and the meaning of those three classes, this three class model seems to be more appellative.

The LC models identified three distinct class groups with homogenous patterns of unhealthy related behaviors will be described below. Of the 274,293 participants, 83% were classified as Physically inactive, 11% as Smokers and about 6% as Heavy drinkers (Table 3).

Class Profiles: Description

This section will detail the characteristics of each class and identify the specific group of people who were most likely to be in a particular class. Table 3 identified the unhealthy lifestyle class.

The Physically inactive class (83.3%): this group reported the highest probabilities of unhealthy diet (88.8%), all members were none smokers and lacked physical activity. This class contained the largest number of study participants.

The Smokers class (11.2%): all members were smokers, reported lowest levels of unhealthy diet (10.3%) and about 28% of the individuals drank heavily an average in the previous week.

The Heavy drinkers class (5.5%): all members were never smokers and they lacked physical activity and the majority of the sample (71.6%) drank heavily an average in the previous week (see Table 3).

DISCUSSION

To date, research on the association between health's related behaviours and self rated health has been limited. [22] Only a few studies have evaluated self rated health in community samples of people with diabetes and there is a lack of information regarding the association between self rated health and diabetes specific problems. [23] Our study aimed to evaluate the usefulness of SRH as an indicator of lifestyle related health status by examining the relationship between SRH and lifestyle habits in a Portuguese sample with diabetes aged 15 years and over. Using 2005/2006 Portuguese National Health Interview Survey data, three classes of health related behaviours were identified: Physically inactive, Smokers and Heavy drinkers and magnitude of the frequency of these behaviour risk factors patterns was determined in a population with diabetes. Physically inactive class (83.3%) accounted for the largest percentage of the Portuguese population with diabetes while the Heavy drinkers class accounted for the smallest (5.5%). Identification of these discernible patterns is important because of their relationship with mortality, morbidity and longevity. [24,25] Benjamins et al. [26] examined the relationship between SRH and mortality and reported that diabetes is a cause of death that show a strong association with SRH. Data from US and German cross-sectional studies showed three clusters of health behaviour including smoking, alcohol consumption, and physical activity and diet, [27] similar to our study.

The association between age, gender and poor SRH is well documented and it has been shown that women report poorer health than men, which is in line with our findings. [28] The findings show that men had higher odds than women to report better health of the SRH scale. Concerning age, previous findings confirm that ageing is linked with worse SRH. Our study is consistent with the findings of Darviri C. et al. [2]

Individuals with good to excellent SRH were more likely married or living with a partner. [23] Our results suggested that individuals with positive SRH were more likely divorced and widowed, after adjusting to other variables. Low education has been related to poor SRH in numerous studies. [29,30] Education is a key component of socioeconomic status affecting people´s opportunities for obtaining a better job and higher living standard. It can also affect people´s lifestyle and health behaviour which might explain the importance of education for health over and above purely wealth-related factors. Although Martinez-

Sanchez and Regidor [31] who also reported that the associations between educational level and negative health were of a small magnitude, our results are consistent with the findings of Mackenbach et al. [32] who found that higher education level was associated with positive SRH. Low socioeconomic status (SES) (in this study assessed by education level) and impaired health are well established determinants of poor SRH. [33] Although the link between SES and health inequalities is far from doubt, mediators of this relationship still remain elusive. The concept of psychosocial mediators, directly or indirectly linked to stress, seems most promising, since maladaptive stress responses entail a broader range of behavioral and physical changes leading to unhealthy lifestyle patterns and physical "wear and tear", all jeopardizing health. [34]

Previous research suggests that healthy lifestyle behaviours are associated with good self rated health in adults with diabetes, including regular physical activity, moderate alcohol intake and not currently smoking. [23] Our findings are consistent with Badawi et al. (2012) which confirmed that alcohol consumption and physical activity were associated with positive SRH. However, the opposite effect was observed in smoking. Exercise and healthy diet are well-known determinants of better SRH. [35] In general, physically inactive individuals reported lower health. [36] Our study has showed such results, even if our measurements were not based on validated physical activity and diet questionnaires. According to our findings, regular exercise and healthy diet are associated with better SRH.

We also looked at the patterns of behaviours risk factors e their association with SRH. As expected, individuals with healthier behaviour patterns [22] were more likely to report positive perceptions of their health. [37] To our knowledge, there no studies that have evaluated the patterns of behaviours risk factors and their relationship with self rated health in a Portuguese population with diabetes.

Limitations

The present study has certain limitations, which should be considered. First, the data used in this study is self-reported, so social desirability in responses may be an issue. Second, the design of Portuguese National Health is cross-sectional, which means that the data only provides a snapshot of the patterns of health behaviors among the population and in particular in diabetics. Therefore, we can only provide a snapshot of the current health behaviour of the participants. However, we hypothesize that our data reflects typical behaviour patterns. It also means that it not possible to establish whether a causal relationship exists between lifestyle patterns and self-rated health.

Finally, in such circumstances, the 'fair' SRH category may include respondents from both the positive and negative ends of the health spectrum, thus being less discriminative. It is essential to further explore the meaning of 'fair' health with its relative, value-related position on the SRH scale in relation to possible socio cultural differentiation.

CONCLUSION

Health inequalities are related to socio-demographics characteristics and lifestyle. This study shows that men, younger age, higher level of education in contrast with lower education level´s, divorced and widower marital status in contrast with married were all associated with positive SRH. Alcohol consumption, physical activity and healthy diet were associated with positive SRH, after adjusting for socio demographic characteristics. This research has also found three behavioural

risk factor patterns in diabetics: Physically inactive (83.3%), Smokers (11.2%) and Heavy drinkers (5.5%). It is therefore essential to develop specific interventions that consider these behaviour risk factors patterns in control programmes for diabetes.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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REFERENCES

1. Waite R., Davey M., Lynch L: Self-Rated Health and Association with ACEs. Journal of Behavioral Health 2013, 2: 197-205.
2. Darviri C, Artemiadis AK, Tigani X, Alexopoulos EC: Lifestyle and self-rated health: a cross-sectional study of 3,601 citizens of Athens, Greece. BMC Public Health 2011, 11:1-9.
3. Yamada C., Moriyama K., Takahashi E: Self-rated health as a comprehensive indicator of lifestyle-related health status. Environ Health Prev Med 2012, 17:457-462.
4. Manderbacka K, Lundberg O, Martikainen P: Do risk factors and health behaviours contribute to self-ratings of health ? Social Science & Medicine 1999, 48:1713-1720.
5. Poortinga W. The prevalence and clustering of four major lifestyle risk factors in an English adult population. Prev. Med. 2007, 44:124-128.
6. Gómez CM, Bosch DR, Riera PT, Veny MB, Beltran JP, Andreu SM, Pons AA. Clustering of lifestyle factors in Spanish university students: the relationship between smoking, alcohol consumption, physical activity and diet quality. Public Health Nutr 2012, 15:2131-2139.
7. Girón P: Determinants of self-rated health in Spain: differences by age groups for adults. Eur J Public Health 2010, 22:36-40.
8. Conry MC, Morgan K, Curry P, McGee H, Harrington J, Ward M, Shelley E: The clustering of health behaviours in Ireland and their relationship with mental health, self-rated health and quality of life. BMC Public Health 2011, 11:1-10.
9. Instituto Nacional de Saúde Doutor Ricardo Jorge. Instituto Nacional de Estatística. Inquérito Nacional de Saúde 2005/2006. INSA, Lisboa, 2009.
10. Centers for Disease Control and Prevention. Alcohol and Public Health. Department of Health and Human Services, Atlanta, GA, 2013.
11. Aguiar P, Neto D, Lambaz R, Chick J, Ferrinho P. Prognostic Factors During Outpatient Treatment for Alcohol Dependence: Cohort Study with 6 months of Treatment Follow-up. Alcohol 2012, 0:1-9.
12. Vidal PM, Dias CM. Trends and Determinants of Alcohol Consumption in Portugal: Results From the National Health Surveys 1995 to 1996 and 1998 to 1999. Alcohol Clin Exp Res. 2005, 29:89-97.
13. Centers for Disease Control and Prevention. UK Physical Activity Guidelines. Department of Health and Human Services, Atlanta, GA, 2011.
14. Costa E, Oliveira L, Gonçalves L, Dias CM: Dietary patterns of the Portuguese population with and without self-reported diabetes: data from the fourth National Health Interview Survey. International Journal of Health Sciences and Research (unpublished article, under review process).
15. Dunn KM, Jordan K, Croft PR: Characterizing the Course of Low Back Pain: A Latent Class Analysis. Am J Epidemiol 2006, 163:754-761.
16. Yang CC: Evaluating latent class analysis models in qualitative phenotype identification. Comput Stat Data Anal 2006, 50:1090-1104.

17. Laska MN, Pasch KE, Lust K, et al: Latent Class Analysis of Lifestyle Characteristics and Health Risk Behaviors among College Youth. Prev Sci. 2009, 10:376-386.
18. Biemer P: Latent Class Analysis of Survey Error. New Jersey: Wiley. 2011.
19. Langeheine R, Pannekoek J, Van de Pol F: Bootstrapping goodness-of-fit measures in categorical data analysis. Sociol Methods Res 1996, 24:492-516.
20. Vermunt JK, Magidson J: Latent Gold® 4.0 User´s Guide. Belmont, MA: Statistical Innovations Inc.; 2005
21. Reedy J, Wirfa¨lt E, Flood A, Mitrou P, Krebs-Smith S, Kipnis V, Midthune D, Leitzmann M, Hollenbeck A, Schatzkin A, Subar A: Comparing 3 Dietary Pattern Methods–Cluster Analysis, Factor Analysis, and Index Analysis–With Colorectal Cancer Risk The NIH-AARP Diet and Health Study. American Journal of Epidemiology 2010, 171:479-487.
22. Verger P, Lions C, Ventelou B: Is depression associated with health risk related behaviour clusters in adults? European Journal of Public Health 2009, 19:618-624.
23. Badawi G, Gariépy G, Pagé V, Schmitz N: Indicators of self-rated health in the Canadian population with diabetes. Diabetic Medicine 2012, 1021-1027.
24. Abdel-Qadir H, Lee D: The contribution of famial and heriatable risks in heart failure. Current Opinion Cardiology 2007, 22:214-219.
25. Khaw Kay-Tee, Wareham N, Bingham S, Welch A, Luben R, Day N: Combined Impact of Health Behaviours and Mortality in Men and Women: The EPIC-Norfolk Prospective Population Study. PLoS Medicine 2008, 5.
26. Benjamins MR, Hummer RA, Eberstein IW, Nam CB: Self reported health and adult mortality risk: an analysis of cause specific mortality. Soc Sci Med. 2004, 59: 1297-1306.
27. Schneider S, Huy C, Schuessler M, Diehl K, Schwarz S: Optimising lifestyle interventions: identification of health behaviour patterns by cluster analysis in a German 50+ survey. European Journal of Public Health 2009, 19: 271-277.
28. Unden AL, Elofsson S, Andreasson A, Hillered E, Eriksson I, Brismar K: Gender differences in self-rated health, quality of life, quality of care, and metabolic control in patients with diabetes. Gend Med 2008, 5:162–80.
29. Pikhart H: Social and psychosocial determinants of self-rated health in central and eastern Europe. Kluwer Academic Publishers, Boston. 2002.
30. Leinsalu M: Social variation in self-rated health in Estonia: a cross-sectional study. Soc Sci Med 2002, 55:847–861.
31. Martinez-Sanchez E, Regidor E: Self-rated health by education level in persons with and without health problems. J Health Psychol 2002, 7: 459–468.
32. Mackenbach JP, Van den Bos J, Joung IMA, Van de Mheen H, Stronks K: The determinants of excellent health: different from the determinants of ill-health? Int J Epidemiol 1994, 23:1273–1281.
33. Foraker, R.E., Rose, K.M., Chang, P.P., McNeill, A.M., Suchindran, C.M., Selvin, E., Rosamond, W.D: Socioeconomic status and the trajectory of self-rated health. Age Ageing 2011, 40: 706-711.
34. McEwen, B.S., Gianaros, P.J: Central role of the brain in stress and adaptation: Links to socioeconomic status, health, and disease. Ann. N. Y. Acad. Sci. 2010, 1186: 190–222.
35. Södergren, M., Sundquist, J., Johansson, S.E., Sundquist, K: Physical activity, exercise and self-rated health: A population-based study from Sweden. BMC Public Health 2008, 8: 352.
36. Freyer-Adam J, Gaertner B, Tobschall S, John U: Health risk factors and self-rated health among job-seekers. BMC Public Health 2011, 11: 1-9.

37. Harrington J, Ivan P, Lutomski J, Fitzgerald A, Sheily F, McGee H, Barry M, Van Lente E, Morgan K, Shelly E: Living longer and feeling better: Health lifestyle, self rated health, obesity and depression in Ireland. European Journal of Public Health 2009, 20: 91-95.

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5. GENERAL DISCUSSION

In this work, the overall aim was to investigate the association between the clustering of major behavioral risk factors (smoking, heavy drinking, physical inactivity and unhealthy diet) among Portuguese population aged 15 years and over, with self-reported diabetes, and the Self-Rated Health (SRH) of this population reported in the fourth Portuguese National Health Interview Survey (NHIS).

Information on unhealthy diet could not be retrieved directly from the fourth Portuguese NHIS because it only uses a few questions about food intake reported over a 24 hour period not providing quantitative diet information. Nevertheless, NHIS is still the only population based tool regularly producing nationally representative data on food consumption in Portugal, and some authors consider that detailed information, characteristic of nutrition surveys, is not always necessary when the objective is to characterize and classify the population into large categories of food habits (Kim et al., 2003; Rohrmann et al.2003); for example, WHO uses only four questions about the consumption of fruits and vegetables in a typical week to characterize the diet of the population through questionnaire for the surveillance of risk factors for chronic disease (WHO, 2008b).

Those facts lead us to developed indicators of an unhealthy dietary pattern based on the self reported information about eating habits from the fourth Portuguese NHIS in order to identify different dietary patterns in subgroups of the population with and without self reported diabetes as described in **paper I.**

The current knowledge about the clustering of behavioral risk factors in the Portuguese population with diabetes, at a national level and in a health public health perspective, is scarce. Health indicators available in Portugal related to behavioral risk factors do not address them jointly, so the approach of clustering

behavioral risk factors is nonexistent in official statistics and in reports from official organizations. Internationally, knowledge about the clustering of behavioral risk factors is also not frequent and it is usually obtained in studies that include non-behavioral factors and clinical variables (Cardi et al., 2009). The lack of information about clustering of behavioral risk factors is reflected in public health intervention as we can verify in the National Program of Integrated Intervention about Health Determinants related to Lifestyle, which only refers single intervention on each behavioral risk factors and does not mention the importance of addressing the clustering of behavioral risk factors (Portugal.MS.DGS, 2003).

Therefore, in **paper II** we investigated the prevalence and the clustering of behavioral risk factors (smoking, heavy drinking, physical inactivity and unhealthy diet) in subgroups of the population with and without self reported diabetes. In addition, this study explored the socio-demographic variation in the clustering of the four behavioral risk factors in order to identify the groups with higher risk.

The knowledge of the self-perception of health status is essential for better planning in health, not only due to its role as a determinant of health, but also because it is related with the adoption of health promoting behaviours (Araújo et al., 2011). SRH is a simple, easy to administer measure of general health. According to Bombak (2013), it is inherently a subjective measure of internal perceptions and priorities.

It is important to know the perception of people with diabetes on the quality of their life. As a chronic disease diabetes requires ongoing education and health care for prevention of acute complications reducing the risk of their late complications, thus maintaining the quality of life of the people with diabetes. Diabetes should not be assessed only in a clinical perspective but also including economic and social aspects of burden of disease. Therefore, the SRH is a very important indicator of health status of people because it measures people's subjective perception about their physical and mental state; it is independent of clinical interpretations and it is also an important predictor of mortality and of use of health care (Vintém, 2008).

According to the information published on the site of the Portuguese Society of Diabetology, Portugal has already a specific measure of quality of life for people with diabetes that is the SRH, it seems important to apply it nationally, as a measure to provide in detail what often escapes to the current measures. On the other hand, in our country there is no known measure of quality of life integrated in clinical file of each diabetic patient. In this context, in addition to biological parameters it is important to consider the perception of people with diabetes on their quality of life.

To our knowledge, in Portugal there are no studies that have evaluated the clustering of behavioral risk factors in a population with diabetes with the aim of studying the association of these risk factors with self-rated health.

Consequently, in **paper III** we studied the association of the patterns of behaviour risk factors in the Portuguese population with diabetes aged 15 years and older and their SRH, in contrast to the majority of the published studies that focus on isolated behaviours (Campbell et al., 2011; Yamada et al., 2012).

5.1 Internal validity of data

5.1.1 Study design

The descriptive, observational epidemiological study performed with a cross sectional design does not allow studying the causal relationships between the behavioral risk factors and diabetes. Nevertheless, this methodological limitation does not affect the achievement of the objectives set in advance for this work, since we did not intend to assess the causal relationship between behavioral risk factors and the incidence of diabetes. The aim of this study was to evaluate the clustering of the four behavioral risk factors and not their interdependencies, in which the presence of a risk factor may explain the occurrence of another.

We can consider that neither the research questions nor the reference periods used in the collection of data jeopardize the analysis of clustering of four behavioral risk factors, in particular through temporal bias (Sacket, 1979; Bowling, 2014). We can assume that the reference periods related to the studied behavioral risk factors is short (one week maximum) and that these factors have effect at a longer time scale. Among the questions used as collection instrument of the variables that characterize the four behavioral risk factors, those about food refer to the 24 hours before the interview, those regarding consumption of alcoholic beverages and physical activity have a wider reference period, namely the week preceding the interview and data collection, and those about smoking refer to the current consumption. (Portugal.MS.INSA.INE, 2009).

5.1.2 Study population

The study population was the Portuguese population aged 15 years and older living in private households and identified through a representative sample used in the fourth Portuguese NHIS (Portugal.MS.INSA.INE, 2009) conducted between February 2005 and February 2006.

Participants younger than 15 years (3417) and participants with missing data were excluded. The restriction on age is a consequence of the availability of data for the four behavioral risk factors. For example, physical activity was reported only for people aged 15 years and older. On the other hand the prevalence of Type 2 Diabetes (T2D) in individuals with less than 15 years is negligible (Portugal.MS.INSA.INE, 2009). According to WHO, 15 years and older correspond to the age at which all instruments and methods of inquiry are applicable in accordance with recommendations of international organizations (WHO, 2003).

The sampling frame was selected from the five Mainland NUTS II regions (North, Centre, Lisbon and Vale do Tejo, Alentejo and Algarve) and the two NUTS II autonomous regions of Azores and Madeira.

The data collection process was conducted by two National Public Institutes using probabilistic sampling methods of the Portuguese population through interviews at home using valid and stable instruments and procedures. A description of the methodology of the sample selection is available and already published (Portugal.MS.INSA.INE, 2009).

The population studied in paper I consisted of 41,193 respondents living at 15,239 household addresses. A subgroup of the surveyed population in the second trimester of the fieldwork was evaluated in papers II and III because physical activity was only surveyed in that trimester. It was considered that data concerning only the second trimester of the fieldwork did not affect the representativeness of the results, nor precluded its extension to the population, since the data was weighted to account for the probability of households and individuals being selected to take part in the survey sample during the second trimester, according with the methodology developed by the National Institute of Statistics and the National Institute of Health.

Data analysis performed in this study cannot be extrapolated to the population living in collective households nor to other non classical households, since the sample used in the fourth Portuguese NHIS excluded collective households.

5.1.3 Data source: the fourth Portuguese NHIS

People who responded to the fourth Portuguese NHIS were surveyed in their households by trained interviewers using a structured questionnaire, computerized and adapted to the interview method assisted by computer (Computer Assisted Personal Interview - CAPI), composed of questions, most of them closed (Portugal.MS.INSA.INE, 2009).

The use of CAPI methodology in health interview surveys is advantageous, because it facilitates the follow-up of the logical sequence of questions by the interviewer, which contributes to decrease the total time of the interview, typos, and missing and inconsistent values (U.S. Centers for Disease Control and Prevention, 2010).

Restricting the analysis to participants aged 15 years and older also safeguards against the bias wherein the information regarding participants younger than 15 years is usually provided by a privileged informer, e.g. an adult resident in the household (Portugal.MS.INSA.INE, 2009).

In the case of absent people in the household or people with physical disability or otherwise which had difficulty in communicating with the interviewer, it was admitted the answer given by a privileged informer (Portugal.MS.INSA.INE, 2009); therefore the potential bias resulting from this approach cannot be eliminated.

Stratified analysis of the data, or the use of data only resulting from responses provided by the informer himself, are two approaches that minimize this bias. However, both have the limitation of reducing the number of participants in the analysis with the consequent decrease in the accuracy of the estimates (Portugal.MS.INSA.INE, 2009).

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5.1.4 Study variables

The fourth Portuguese NHIS included questions structured in several themes from which we defined the variables of this study. To achieve the goals we studied variables for the following themes: socio-demographic description, health status, chronic disease, habits with respect to smoking, food and beverage consumption and physical activity.

The socio-demographic description used the following variables: sex, age, marital status and education level. Of these, only the data relating to sex variable were used in its original form. The other variables were recoded into a different variable, as described in chapter “Materials and Methods”.

The variables which were used to describe the behavioral risk factors were: consumption of tobacco, heavy drinking, physical inactivity and unhealthy diet. The definition of these variables was described in chapter “Materials and Methods” and followed the international recommendations.

The use of SRH as health indicator used a single question. Participants rated their overall health on a scale with five possible alternative answers: ‘very good’, ‘good’, ‘fair’, ‘bad’ or ‘very bad’. The answers were split into two SRH categories- positive (combining very good and good health) and negative (fair, bad and very bad health).

5.2 External validity of data

The current knowledge about the association between clusters of behavioral risk factors and diabetes is scarce. Internationally, this research constitutes one of the few studies which connected several behavioral risk factors such as smoking, heavy drinking, physical inactivity and unhealthy diet in a diabetic population with SRH (Badawi et al., 2012). There is evidence that combinations of these four important and most prevalent risk factors are more detrimental to people’s health than would be expected from the addition of the individual effects alone (Gómez et al., 2012; Slattery et al., 2002).

In this study we investigated the association between the clustering of the above referred major behavioral risk factors among Portuguese population aged 15 years and over, with self-reported diabetes, and the SRH of this population. However, the present study has certain limitations, which should be considered.

First, the time lag between the data from the fourth Portuguese NHIS and its present use requires caution in interpreting the results of this work. However, to date there is no other system regularly producing nationally representative data to monitor and investigate the behavioral risk factors in the Portuguese population.

Second, the data used in this study is self-reported, so social desirability in responses may be an issue (Conry et al., 2011). Social desirability refers to a tendency to respond to self-report items in a manner that makes the respondent look good rather than to respond in an accurate and truthful manner (Holtgraves, 2004). For example, people tend to underreport engaging in

socially undesirable behaviors, such as consumption of alcohol and tobacco use.

Third, the design of fourth Portuguese NHIS is cross-sectional, which means that the data only provides a snapshot of the patterns of health behaviors among the population. Therefore, we can only provide a snapshot of the current health behavior of the participants. However, we hypothesize that our data reflects typical behavior patterns. With this study design is not possible to establish whether a causal relationship exists between lifestyle patterns and self-rated health.

Nevertheless, there are several advantages of being able to have a cross-sectional study. Levin (2006) argues that the cross-sectional studies are relatively quick and easy to conduct (no long periods of follow-up); data on all variables is only collected once, and are able to measure prevalence for all factors under investigation; therefore, multiple outcomes and exposures can be studied. Additionally, the prevalence of disease or other health related characteristics are important in public health for assessing the burden of disease in a specified population and in planning and allocating health resources, and are also good for descriptive analyses and for generating hypotheses.

Finally, we believe as being a limitation of this study the existence of the “fair” SRH category which may include respondents from both the positive and the negative ends of the health spectrum, thus being less discriminative. It is essential to further explore the meaning of “fair” health with its value-related position on the SRH scale according to possible socio cultural differentiation.

5.2.1 Dietary patterns of the Portuguese population

In **paper I** we characterized the dietary patterns of the Portuguese population aged 15 years and over with and without diabetes and the results show overall that the dietary pattern was similar between people with and without diabetes.

To investigate the dietary patterns in both groups of individuals we defined the following dietary pattern variables: i) dietary diversity, ii) consumption of fruit and vegetables and iii) number of main meals per day. The scoring system was recorded, according to international recommendations, to dichotomize this variables and therefore creating the indicators of an unhealthy dietary pattern based on self-reported information about eating habits from the fourth Portuguese NHIS.

We identified two distinct groups in diabetic and non-diabetic individuals with different dietary pattern using the Latent Class Analysis (LCA) statistical techniques and based on this profile we classified the diabetic and non diabetic individuals belonging to classes 1 and 2 as having an unhealthy dietary intake and healthy dietary intake, respectively. The highest proportion of participants was classified into the class of unhealthy dietary patterns both in diabetics and non diabetics (81.9% versus 73.9%).

The information about the dietary pattern in the Portuguese population is scarce. The comparison of our results is hampered due the lack of updated data, as well as the lack of other national studies, including National Food Consumption surveys.

For example, the Porto dietary survey (Lopes et al., 2006) performed in the Portuguese population among women and men aged 18 years and older living in Porto defined four dietary patterns. This work was based on 26 foods grouped according to the similarity in their nutritional composition. One of the conclusions of this work was that daily 91% and 87% of women and men, respectively, consume fruits.

According to the Global Status Report on non communicable diseases 2014 (WHO, 2014b) European Region had about 60% prevalence of unhealthy diet. However, according to the Global Health Observatory data (WHO, 2010b), aligning varying sources and types of data to generate overall estimations of unhealthy diet prevalence is not possible due to the absence of comparable data on individual dietary intakes around the world.

The dietary patterns are very heterogeneous across the word regions and the differences in dietary patterns across the world are not well studied. For

example, the Japanese population consumes high volumes of both fish and sodium. Little is known about dietary patterns across the world based on consumption of healthier foods and nutrients versus consumption of unhealthy foods and nutrients (Imamura et al., 2015).

The healthy dietary pattern and unhealthy dietary pattern might not be concordant across countries. For example, in the study conducted by Imamura et al, (2015) about dietary quality among men and women in 187 countries, two healthy different dietary patterns were modeled: one reflecting greater consumption of ten healthy dietary items (fruits, vegetables, beans and legumes, nuts and seeds, whole grains, milk, total polyunsaturated fatty acids, fish, plant omega-3s, and dietary fibre); and the other based on lesser consumption of seven unhealthy dietary items (unprocessed red meats, processed meats, sugar sweetened beverages, saturated fat, trans fat, dietary cholesterol, and sodium). This study concluded that the global diet quality heterogeneity is evident for dietary patterns based on eating healthier versus fewer unhealthy foods and nutrients.

The comparative analysis of the dietary patterns between different populations is difficult, since published studies differ in methods for collecting information about eating habits, relate to different time periods and use different indicators to assess the dietary pattern. To our knowledge, there are no studies that have evaluated dietary patterns in a Portuguese population with and without diabetes.

5.2.2 Behavioural risk factors and their clustering in a Portuguese population

In paper II we investigated the prevalence and the clustering of four behavioural risk factors in a study population with and without self reported diabetes. We were interested in evaluating whether the major behavioral risk factors appear in identical or different manner in diabetic and non diabetic groups.

In addition, this study explored the socio-demographic variation in the clustering of the four behavioural risk factors in order to identify the groups that are the most at risk.

Our results show that 7.0% and 20.5 % of the Portuguese population aged 15 years and over with and without diabetes, respectively, smoked. In our study the percentage of non diabetic smoker individuals is consistent with international estimates (WHO, 2014a). The lower percentage of diabetic smoker individuals was expected assuming that smoking is more monitored in these individuals. In 2012, the global prevalence of current smoking among adults was estimated at around 22% (WHO, 2014a). The highest regional average rate for smoking in 2012 was 30% in the WHO European Region while the lowest rate was 12% in the African Region.

Regarding alcohol consumption, Centers for Disease Control and Prevention considers two patterns of "excessive consumption of alcohol": 1) the excessive occasional consumption (binge drinking), defined as the consumption, on the same occasion, of five or more drinks for men, or four or more drinks for women; 2) heavy drinking, defined as more than two drinks per day on average for men or more than one drink per day on average for women.

According to WHO (2014b), in 2010 the prevalence of heavy episodic drinking, often referred to as “binge drinking” in the past 30 days was 16.5% in European region and 7.5% worldwide (WHO, 2014b).

In accordance with U.S Department of Health & Human Services of the National Institute on Alcohol Abuse and Alcoholism in 2013, 6.8 percent reported that they engaged in heavy drinking in the past month, however for this institute heavy drinking is defined as drinking 5 or more drinks on the same occasion on each of 5 or more days in the past 30 days.

In our study less than 1% of the studied Portuguese population aged 15 years and over, with and without diabetes, drank heavily in the last week. The difference between our results and international estimates may be due to the use of different pattern definitions for excessive alcohol consumption. Furthermore, there is a wide variation in total alcohol consumption between different countries since it is highly dependent on the culture of each society.

Concerning physical inactivity, our results show that approximately 20% and 10% of the Portuguese population aged 15 years and over with and without diabetes, respectively, were physically inactive. According to WHO (2010a) in 2010, 31% of adults aged 15 years and over worldwide were physically inactive. Our results showed that the proportion of people that were physically inactive was less than what could have been expected on the basis of the international estimates. Probably the difference between our findings and the international estimates are due to the lack of the definitions agreed of physical activity and sedentary lifestyle, as well as lack of the methodology universally accepted in epidemiological studies (Dias CM, 2011). Furthermore, some caution is required in the interpretation of self-reported measures as a result of an overestimation error associated in part not only to a bias related to social desirability but also to the cognitive challenges participants have in quantifying the intensity and duration of the activity (Baptista et al. 2011).

In alignment, Baptista et al.(2011) showed that Portugal was, among 15 member states of the European Union, the country with the highest prevalence of ‘‘high physical activity’’ (in the International Physical Activity Questionnaire) (33.1%) when also considering professional, domestic, and transport domains.

Regarding the dietary patterns of the Portuguese population our findings were discussed in the previous section.

Then, we studied the clustering of behavioral risk factors in a Portuguese population. The occurrence of the four behavioral risk factors is similar in diabetic and non-diabetic individuals with 15 or more years old. However, while non diabetics were more likely to have smoking as risk behavior, diabetics were more likely to have physical inactivity. There are 16 possible combinations of behavioral risk factors. For the combination of three unhealthy behaviours, the combination that presented the highest potential for aggregation was smoking, heavy drinking and unhealthy diet (O/E=4.8) for diabetics. Therefore, among diabetics the behavior pattern that indicated a greater increase than that expected at random was the simultaneous occurrence of these three risk factors. For the combination of two unhealthy behaviours, we noted an important magnitude between the combination of smoking and heavy drinking in non diabetics (O/E=20.1).

According to Schuit et al. (2002) a combination of two or more risk factors is usually associated with a higher increased risk of cardiovascular diseases than can be expected on the basis of the sum of the separate effects. In our study we observed that some combinations of two or more behavioral risk factors were more frequent in diabetic individuals than in non diabetic individuals.

However, in both groups of the individuals (diabetics and non diabetics), certain combinations were less prevalent than what could have been expected on the basis of the occurrence of the individual behavioral risk factors alone. For example, in diabetic individuals these mainly involved unhealthy diet, together with heavy drinking (O/E=0.4) or physical inactivity (O/E)=0.7 while in non diabetic individuals the combinations unhealthy diet, together with smoking (O/E)=0.7 or physical inactivity (O/E)=0.8 were less prevalent than what could have been expected on the basis of the occurrence of the individual behavioral risk factors.

Our findings suggested that the risk of lacking a healthy diet is markedly higher for individuals who have physical inactivity, among diabetics (OR=6.5), and the risk of smoking is higher for individuals who have an excessive alcohol consumption, among non diabetics (OR=10.0). This conclusion is similar to study conducted among adolescents from Southern Brazil published by Dumith et al. (2012) which was conducted among adolescents to investigate the clustering of risk behaviours for chronic non communicable diseases.

Finally, we calculated the association between socio-demographic variables and presence of at least two behaviour risk factors and we concluded that men aged 35-44 years, with secondary education level, were more likely to have at least two risk factors, in both diabetics and non diabetic individuals, taking into account the reference women aged ≥75 years with higher education. Several studies have found a consistent socio-demographic gradient in the prevalence of multiple risk factors, with men, younger age groups and those in the lower social classes and with lower levels of education being more likely to exhibit multiple behavior risk factors (Poortinga, 2007; Tobias et al., 2007; Shankar et al., 2010; Dias CM, 2011).

5.2.3 Positive self rated health in a Portuguese population with diabetes

As presented in paper III we investigated the association between behavioral risk factors in the population with self reported diabetes and their SRH. The use of SRH to assess individuals' perception of their health, in order to motivate behavior change, has important practical implications (Bombak, 2013). Thus, a greater understanding of SRH will help in the development of more effective behavioral interventions.

Our findings show that 11% of the Portuguese population aged 15 years and over with diabetes reported positive SRH. However, the comparison of our results with other studies and with the international estimates is hampered by the absence of globally agreed methodology for assessment of SRH. The different cultural modes of behavior among countries may also contribute to data inconsistencies.

According to information published on the site of the European Commission we observed that in 2013 the proportion of Portuguese population who assess their health to be very good or good is 50.3. This value is lower than the mean of the Union European countries (66.8). Ireland and Latvia are the countries with highest (82.3) and lowest (45.4) proportion, respectively, of people who assess their health to be very good or good.

SRH used as an indicator used for monitoring the health status and the quality of life, should not be dissociated from education level and gender (Vintém, 2008). Our results suggested that men with high level of education (in contrast with low education levels) were all associated with positive SRH, which in line with the literature (Mackenbach et al, 1994; Unden et al., 2008).

Three distinct groups were identified, using the LCA, among diabetic population with homogenous patterns of unhealthy related behaviours: Physically inactive, Smokers and Heavy drinkers.

The first group, class 1, reported the highest probabilities of unhealthy diet (88.8%), all members were non-smokers and lacked physical activity. This class included the largest number of study participants (83.3%).

Another group, class 2, was preferentially the '*Smokers*', which comprised all members who were smokers, 10% of the individuals who had unhealthy diet and about 28% of the individuals who had drunk heavily on average in the previous week.

The last class, 3, was preferentially the '*Heavy drinkers*', in which all members were never smokers and lacked physical activity. This class also contained the majority of the individuals who had drunk heavily in the previous week (71.6%). This class included the smallest number of study population (5.5%).

The binary logistic regression was performed to study the association between these three groups and SRH. The model tendentiously indicated that individuals belonging to classes 1 and 2 were associated with positive SRH. The opposite effect was observed with individuals belonging to class 3.

Identification of these discernible patterns is important because of their relationship with mortality, morbidity and longevity (Abdel-Qadir et al., 2007; Khaw et al., 2008).

5.3 Conclusions and Recommendations

5.3.1 Conclusions

The results obtained in this study allowed to describe the dietary pattern of the Portuguese population and increased the knowledge about the clustering of major behavioral risk factors in the Portuguese population aged 15 years and over with diabetes, and their SRH according to the aims defined in this work. We started by studying the clustering of behavioral risk factors in Portuguese population with and without diabetes because we were interested in evaluating if these behavioral risk factors appeared in identical or different manner in both groups.

• As shown in paper I the classification of Portuguese population in two different dietary pattern groups may contribute to future analysis where the information about individuals with an unhealthy dietary pattern is relevant. For instance, men were more likely to belong to the unhealthy dietary pattern than women and people who had 15-34 years and with the lowest level of education were also more likely to be in the less favourable dietary group. Thus, the promotion of healthier eating habits in these groups would successfully stop increasing or even reduce diabetes.

• Given that behavioral risk factors such as those investigated in the present study are potentially modifiable, identifying subgroups that are at higher risk of simultaneously displaying multiple factors is of extreme importance if we wish to reduce the propensity to the diabetes. Among the Portuguese population surveyed, 8.9% of individuals with diabetes and 19.5% of individuals without diabetes accumulated two or three behavioral risk factors. The most frequent combination of two or more risk behavioural factors was smoking, heavy drinking and unhealthy diet in diabetic individuals. Smoking and heavy drinking was the most frequent combination in non-diabetic individuals.

• Our results show that there are specific groups within the adult Portuguese population with diabetes and without diabetes that have an overall risky lifestyle. The results suggested that multiple risk factors were more prevalent among men who had 35-44 years, who had secondary education, and who were single, when diabetic, or divorced when non-diabetic.

• Among the population with diabetes aged ≥ 15 years, 11% report positive SRH and 89% report negative SRH. Men with high level of education (in contrast with low education levels) were associated with positive SRH. Physical activity and healthy diet were associated with positive SRH, after adjusting for socio demographic characteristics. The opposite effect was observed with smoking.

5.3.2 Recommendations

• The self-reported assessment methods are under-reporting or over-reporting and this may have introduced bias to the data. It is important to apply new methods and perform new studies without self-reported information to assess the behavioral risk factors and the presence or absence of diabetes.

• New strategies to make surveys more efficient and timely, such as quantitative information on food consumed, are needed in order to simplify the dietary assessment of the Portuguese population based on the international recommendations.

• It would be important the existence of agreed methods for monitoring of unhealthy diet, alcohol consumption and physical inactivity.

• It is important to further explore the meaning of “fair” health with its value related position on the SRH scale according to possible socio cultural differentiation. In such studies the “fair” SRH category may include respondents from both the positive and negative ends of the health spectrum, thus being less discriminative.

• It would be useful to perform–longitudinal studies in order to identify, from a causality point of view, the relationship between the presence of behavioral risk factors in people with diabetes and their SRH.

• It would be important to include in the National Diabetes Program some intervention measures that aim the clustering of behavioral risk factors. An intervention may have as objective addressing one or more behavioural risk factors.

• It would be useful to integrate an indicator of quality of life such as the SRH in the clinical file of each diabetic patient. In this context, in addition to biological

parameters, it is important to know the perception of quality of life of people with diabetes.

6. BIBLIOGRAPHY

A

Abdel-Qadir H and Lee D (2007) The contribution of familial and heritable risks in heart failure. *Current Opinion in Cardiology* 22 (3): 214-219.

Abu-Omar K, Rutten A and Robine JM (2004) Self-rated health and physical activity in the European Union. *Social and Preventative Medicine* 49 (4)**:** 235-242.

Aguiar P, Neto D, Lambaz R, Chick J, Ferrinho P (2012) Prognostic factors during outpatient treatment for alcohol dependence: cohort study with 6 months of treatment follow-up. *Alcohol and Alcoholism* 47(6): 702-710.

Alamian A and Paradis G (2009) Clustering of chronic disease behavioral risk factors in Canadian children and adolescents. *Preventive Medicine* 48 (5): 493–499.

Alberti KG and Zimmet PZ (1998) Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. *Diabetic Medicine* 15(7): 539-553.

Almdal T, Scharling H, Jensen JS, Vestergaard H (2008) Higher prevalence of risk factors for type 2 diabetes mellitus and subsequent higher incidence in men. *European Journal of Internal Medicine* 19(1): 40–45.

American Diabetes Association (2011) Diagnosis and classification of diabetes mellitus. *Diabetes Care* 34(Suppl 1): S62-S69.

Anderson P and Baumberg B (2006) Alcohol in Europe. London: Institute of Alcohol Studies.

Araújo J, Ramos E and Lopes C (2011) Estilos de vida e percepção do estado de saúde em idosos portugueses de zonas rural e urbana. *Acta Médica Portuguesa* 24(S2): 79-88.

Atkins D and Clancy C (2004) Multiple risk factors interventions: are we up to the challenge? *American Journal of Preventive Medicine* 27(2 Suppl): 102–103.

Attvall S, Fowelin J, Lager I, Von Schenck H, Smith U (1993) Smoking induces insulin resistance-a potential link with the insulin resistance syndrome. *Journal of Internal Medicine* 233(4): 327-332.

B

Badawi G, Gariépy G, Pagé V, Schmitz N (2012) Indicators of self-rated health in the Canadian population with diabetes. *Diabetic Medicine* 29(8):1021-1028.

Bailis DS, Segall A and Chipperfield JG (2003) Two views of self-rated general health status. *Social Science & Medicine* 56(2): 203-217.

Baptista F, Santos DA, Silva AM et al. (2011) Prevalence of the Portuguese Population Attaining Sufficient Physical Activity. *Medicine and Science in Sports and Exercise* 466-473.

Beardsworth A, Bryman A, Keil T, Goode J, Haslam C, Lancashire E (2002) Women, men and food: the significance of gender for nutritional attitudes and choices. *British Food Journal* 104 (7): 470–491.

Benjamins MR, Hummer RA, Eberstein IW, Nam CB (2004) Self-reported health and adult mortality risk: an analysis of cause specific mortality. *Social Science & Medicine* 59(6): 1297-1306.

Biemer P (2011) *Latent Class Analysis of Survey Error.* New Jersey: Wiley.

Berrigan D, Dodd K, Troiano RP, Krebs-Smith SM, Barbash RB (2003) Patterns of health behavior in U.S. adults. *Preventive Medicine* 36(5): 615-623.

Bombak AE (2013) Self-rated health and public health: a critical perspective. *Front Public Health* 1(15): 1-4.

Bowling A (2014) *Research Methods in Health: Investigating Health and Health Services.*New York: McGraw Hill Education.

Boyle P, Gray N, Henningfield J, Seffrin J, Zatonski W (2005) *Tobacco: science, policy and public health.* New York: Oxford University Press.

Buck D and Frosini F (2012) *Clustering of unhealthy behaviours over time: implications for policy and practice*. London: The Kings Fund.

Bull FC and The Expert Working Groups (2010) *Physical Activity Guidelines in the UK: Review and Recommendations.* Loughborough: School of Sport, Exercise and Health Sciences, Loughborough University.

Burke V, Milligan RAK, Beilin LJ et al. (1997) Clustering of health-related behaviors among 18-yearold Australians. *Preventive Medicine* 26(5): 724-733.

C

Campbell HM, Khan N, Cone C, Raisch DW (2011) Relationship between diet, exercise habits, and health status among patients with diabetes. *Research in Social and Administrative Pharmacy.* 7(2): 151–161.

Cardi M, Munk N, Zanjani F, Kruger T, Schaie W, Willis SL (2009) Health behaviour risk factors across age as predictors of cardiovascular disease diagnosis. *Journal of Aging and Health* 21(5): 759-775.

Chiolero A, Wietlisbach V, Ruffieux C, Paccaud F, Cornuz J (2006) Clustering of risk behaviors with cigarette consumption: a population based survey. *Preventive Medicine* 42(5): 348-353.

Conry MC, Morgan K, Curry P et al. (2011) The clustering of health behaviours in Ireland and their relationship with mental health, self-rated health and quality of life. *BMC Public Health* 11: 1-10.

Correira LG, Boavida JM, Raposo JF et al. (2010) First diabetes prevalence study in Portugal: PREVADIAB study. *Diabetic Medicine* 27(8): 879-881.

Costa E, Gonçalves L, Oliveira L, Dias CM (2014a) Positive self-rated health in a Portuguese population with diabetes: association with socio-demographic characteristics and behaviour risk factors patterns. *International Journal of Health Sciences and Research* 4(12): 257-266.

Costa E, Dias CM, Oliveira L, Gonçalves L (2014b) Clustering of behavioral risk factors in a Portuguese population: data from the National Health Interview Survey. *Journal of Behavioral Health* 3(4): 205-211.

Costa E, Oliveira L, Gonçalves L, Dias CM (2014c) Dietary patterns of the Portuguese population with and without self-reported diabetes: data from the fourth National Health Interview Survey. *International Journal of Health Sciences and Research* 4(12): 267-277.

Curry SJ (2004) Toward a public policy agenda for addressing multiple health risk behaviours in primary care. *American Journal of Preventive Medicine* 27(S2): 106-108.

D

Darmon N and Drewnowskl A (2008) Does social class predict diet quality? *American Journal of Clinical Nutrition* 87(5): 1107-1117.

Darviri C, Artemiadis AK, Tigani X, Alexopoulos EC (2011) Lifestyle and self-rated health: a cross-sectional study of 3,601 citizens of Athens, Greece. *BMC Public Health* 11: 1-9.

DeFronzo RA (1992) Insulin resistance, hyperinsulinemia, and coronary artery disease: a complex metabolic web. *Journal of Cardiovascular Pharmacology* 20(Suppl 11): S1-S16.

Dias CM (2011) *Distribuição conjunta de determinantes de saúde relacionados com comportamentos,* Tese apresentada à ENSP-UNL para obtenção do grau de Doutor em Saúde Pública, Ramo de Epidemiologia.

Dias CM and Briz T (2012) Distribuição conjunta de determinantes de saúde relacionados com comportamentos na população portuguesa. *Observações: Boletim Epidemiológico* 1: 4-5.

Dietler M (2006) Alcohol: anthropological/archaeological perspectives. *Annual Review of Anthropology* 35: 229–249.

Drieskens S, Van Oyen H, Demarest S, Van der Heyden J, Gisle L, Tafforeau J (2010) Multiple risk behaviour: increasing socio-economic gap over time? *European Journal of Public Health* 20(6): 634-639.

Dumith SC, Muniz LC, Tassitano RM, Hallal PC, Menezes AM (2012) Clustering of risk factors for chronic diseases among adolescents from Southern Brazil. *Preventive Medicine* 54(6): 393–396.

Dunn KM, Jordan K and Croft PR (2006) Characterizing the course of low back pain: a latent class analysis. *American Journal of Epidemiology* 163(8): 754-761.

E

Ezzati M, Vander HS, Rodgers A et al. (2003) Estimates of global and regional potential health gains from reducing multiple major risk factors. *Lancet* 362 (9380): 271-280.

F

Facchini FS, Hollenbeck CB, Jeppesen J, Chen YD, Reaven GM (1992) Insulin resistance and cigarette smoking. *Lancet* 339 (8802): 1128-1130.

Fine LJ, Philogene GS, Gramling R, Coups EJ, Sinha S (2004). Prevalence of multiple chronic disease risk factors: 2001 National Health Interview Survey. *American Journal of Preventive Medicine* 27 (2 Suppl): S18–S24.

Foraker RE, Rose KM, Chang PP et al. (2011) Socioeconomic status and the trajectory of self-rated health. *Age and Ageing* 40(6): 706-711.

Ford ES, Bergmann MM, Kroger J et al. (2009) Healthy living is the best revenge: findings from the European Prospective Investigation Into Cancer and Nutrition- Potsdam study. *Arch Intern Med* 169: 1355–1362.

Fornari C, Donfrancesco C, Riva MA et al. (2010) Social status and cardiovascular disease: a Mediterranean case: results from the Italian Progetto CUORE cohort study. *BMC Public Health* 10: 574.

Fourlanos S, Dotta F, Greenbaum CJ et al. (2005). Latent autoimmune diabetes in adults (LADA) should be less latent. *Diabetologia* 48(11): 2206-2212.

Freyer-Adam J, Gaertner B, Tobschall S, Ulrich J (2011) Health risk factors and self-rated health among job-seekers. *BMC Public Health* 11:659.

G

Galán I, Artalejo FR, Tobías A, Díez-Gañán L, Gandarillas A, Zorrilla B (2005) Clustering of behavioural risk factors and their association with subjective health. *Gaceta Sanitaria* 19(5): 370-378.

Gardete CL, Boavida JM, Almeida JPF et al. (2013) Diabetes: Factos e Números 2013: Relatório Anual do Observatório Nacional da Diabetes. Lisboa: Sociedade Portuguesa de Diabetologia.

Gauthier-Chelle K, Mennen L, Arnault N, Rigalleau V, Hercberg S, Gin H (2004) Comparison of the diet of self-declared diabetics with non-diabetics patients in the SU.VI.MAX study: did the diabetics modify their nutritional behaviour? *Diabetes & Metabolism* 30(6): 535-542.

Girón P (2010) Determinants of self-rated health in Spain: differences by age groups for adults. *European Journal of Public Health* 22(1): 36-40.

Gómez CM, Bosch DR, Riera PT et al. (2012) Clustering of lifestyle factors in Spanish university students: the relationship between smoking, alcohol consumption, physical activity and diet quality. *Public Health Nutrition* 15(11): 2131-2139.

Gonzalez EL, Johansson S, Wallander MA, Rodriguez LA (2009) Trends in the prevalence and incidence of diabetes in the UK: 1996-2005. *Journal of Epidemiology and Community Health* 63(4): 332-336.

H

Haffner SM, D'Agostino R, Mykkanen L et al. (1999) Insulin sensitivity in subjects with type 2 diabetes: relationship to cardiovascular risk factors: the Insulin Resistance Atherosclerosis Study. *Diabetes Care* 22(4): 562-568.

Haire-Joshu D, Glasgow RE and Tibbs TL (1999) Smoking and diabetes. *Diabetes Care* 22(11): 1887-1898.

Harrington J, Ivan P, Lutomski J et al. (2009) Living longer and feeling better: health lifestyle, self-rated health, obesity and depression in Ireland. *European Journal of Public Health* 20(1): 91-95.

Hatloy A, Torheim LE and Oshaug A (1998) Food variety: a good indicator of nutricional adequacy of the diet? A case study from an urban area in Mali, West Africa. *European Journal of Clinical Nutrition* 52(12): 891-898.

Henekens CH and Buring JE (1987) *Epidemiology in Medicine.* Boston: Little, Brown and Company.

Heidemann C, Boeing H, Pischon T et al. (2009) Association of a diabetes risk score with risk of myocardial infarction, stroke, specific types of cancer, and mortality: a prospective study in the European Prospective Investigation into Cancer and Nutrition (EPIC)-Potsdam cohort. *Eur J Epidemiol* 24: 281–288.

Heitmann BL, Lissner L and Osler M (2000) Do we eat less fat, or just report so? *International Journal of Obesity and Related Metabolic Disorders* 24(4)**:** 435–442.

Holmila M and Raitasalo K (2005) Gender differences in drinking: why do they still exist? *Addiction* 100(12): 1763-1769.

Holtgraves T (2004) Social Desirability and Self-Reports: Testing Models of Socially Desirable Responding. *Pers Soc Psyc*hol 30(2): 161-172.

Hu G and Tuomilehto J (2007) Lifestyle and outcome among patients with type 2 diabetes. *International Congress Series* 1303: 160-171.

Hulshof KF, Wedel M, Lowik MR et al. (1992). Clustering of dietary variables and other lifestyle factors (Dutch Nutritional Surveillance System). *Journal of Epidemiology & Community Health* 46(4): 417-424.

I

Imamura F, Micha R, Khatibzadeh S, Fahimi S et al. (2015) Dietary quality among men and women in 187 countries in 1990 and 2010: a systematic assessment. *Lancet* 3: e132-e142.

International Diabetes Federation (2013) *IDF Diabetes Atla*s, 6th ed. Brussels, Belgium: International Diabetes Federation.

J

Jensen MK, Sorensen TI, Andersen AT et al. (2003) A prospective study of the association between smoking and later alcohol drinking in the general population. *Addiction* 98(3): 355-363.

K

Kant AK (1996) Indexes of overall diet quality: a review. *Journal of the American Dietetic Association* 96(8) 785-791.

Karam JG and McFarlane SI (2011) Update on the prevention of type 2 diabetes. *Current Diabetes Reports* 11(1): 56–63

Khaw KT, Wareham N, Bingham S, Welch A, Luben R, Day N (2008) Combined impact of health behaviours and mortality in men and women: the EPIC-Norfolk Prospective Population Study. *PLoS Medicine* 5(3): 39-47.

Kim DJ and Holowaty EJ (2003) Brief, validated survey instruments for the measurement of fruit and vegetable intakes in adults: a review. *Preventive Medicine* 36(4): 440-447.

Kleinbaum DG and Klein M (2010) *Logistic Regression; A Self-Learning Text,* 3rd ed. Atlanta, GA, USA: Springer.

Kourlaba G and Panagiotakos DB (2009) Dietary quality indices and human health: a review. *Maturitas* 62(1): 1-8.

L

Laaksonen M, Prattala R and Lahelma E (2003) Sociodemographic determinants of multiple unhealthy behaviours. *Scandinavian Journal of Public Health* 31(1): 37-43.

Langeheine R, Pannekoek J and Van de Pol F (1996) Bootstrapping goodness-of-fit measures in categorical data analysis. *Sociological Methods & Research* 24(4): 492-516.

Lanza ST, Collins LM, Lemmon DR, Schafer JL (2007) PROC LCA: a SAS procedure for latent class analysis. *Structural Equation Modeling* 14(4): 671–694.

Laska MN, Pasch KE, Lust K, Story M, Ehlinger E (2009) Latent class analysis of lifestyle characteristics and health risk behaviors among college youth. *Prevention Science* 10(4): 376-386.

Lawder R, Harding O, Stockton D et al. (2010) Is the Scottish population living dangerously? Prevalence of multiple risk factors: the Scottish Health Survey 2003. *BMC Public Health* 10: 330.

Lawlor DA, O'Callaghan MJ, Mamun AA, Williams GM, Bor W, Najman JM (2005) Socioeconomic position, cognitive function, and clustering of cardiovascular risk factors in adolescence: findings from the Mater University Study of Pregnancy and its outcomes. *Psychosomatic Medicine* 67(6): 862–868.

Leinsalu M (2002) Social variation in self-rated health in Estonia: a cross-sectional study. *Social Science & Medicine* 55(5): 847–861.

Levin KA (2006) Study design III: Cross-sectional studies. *Evidence-Based Dentistry* 7: 24-25.

Liu E, McKeown NM, Newby PK et al. (2009) Cross-sectional association of dietary patterns with insulin-resistant phenotypes among adults without diabetes in the Framingham Offspring Study. *British Journal of Nutrition* 102(4): 576-583.

Lopes C, Oliveira A, Santos AC et al. (2006) Consumo alimentar no Porto. Faculdade de Medicina da Universidade do Porto.

Lopes C, Andreozzi VL, Ramos E, Carvalho MS (2008) Modelling over week patterns of alcohol consumption. *Alcohol and Alcoholism,* 43(2): 215-222.

M

MacCallum RC, Zhang S, Preacher KJ, Rucker DD (2002) On the practice of dichotomization of quantitative variables. *Psychological Methods* 7(1): 19–40.

Mackenbach JP, Van den Bos J, Joung IM, Van de Mheen H, Stronks K (1994) The determinants of excellent health: different from the determinants of ill-health? *International Journal of Epidemiology* 23(6): 1273–1281.

Mailliard M and Sorrel M (2004) Alcoholic liver disease. In: Kasper DL, Braunwald E, Hauser S, Longo D, Jameson JL, Fauci AS (eds) *Harrison's Principles of Internal Medicine,* 16th ed. New York: McGraw-Hill, 1855-1856.

Manderbacka K, Lundberg O and Martikainen P (1999) Do risk factors and health behaviours contribute to self-ratings of health? *Social Science & Medicine* 48(12): 1713-1720.

Marmot M and Wilkinson R (2005) *Social determinants of health,* 2nd ed. Oxford: Oxford University Press.

Martinez-Sanchez E and Regidor E (2002) Self-rated health by education level in persons with and without health problems. *Journal of Health Psycholo*gy 7(4): 459–468.

Mathers CD, Loncar D (2006) Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med* 3: e442.

McEwen BS and Gianaros PJ (2010) Central role of the brain in stress and adaptation: Links to socioeconomic status, health, and disease. *Annals of the New York Academy of Sciences* 1186: 190–222.

Mokdad AH, Marks JS, Stroup DF, Gerberding JL (2004) Actual causes of death in the United States, 2000. *JAMA* 291(10): 1238–1245.

Monti MC, Lonsdale JT, Montomoli C, Montross R, Schlag E, Greenberg DA (2007) Familial risk factors for micro vascular complications and differential male female risk in a large cohort of American families with type 1 diabetes. *Journal of Clinical Endocrinology and Metabolism* 92(12): 4650-4655.

Montonen J, Knekt P, Harkanen T et al. (2005) Dietary patterns and the incidence of type 2 diabetes. *American Journal of Epidemiology* 161(3): 219-227.

N

Nathan DM, Buse JB, Davidson MB et al. (2009) Medical management of hyperglycemia in type 2 diabetes: a consensus algorithm for the initiation and adjustment of therapy: a consensus statement of the American Diabetes Association and the European Association for the Study of Diabetes. *Diabetes Care* 32(1): 193-203.

Nathan DM, Cleary PA, Backlund JY et al. (2005) Intensive diabetes treatment and cardiovascular disease in patients with type 1 diabetes. *New England Journal of Medicine* 353(25): 2643-2653.

Nigg CR, Allegrante JP and Ory M (2002) Theory-comparison and multiple behavior research: common themes advancing health behavior research. *Health Education Research* 17(5): 670–679.

P

Parkes K (2006) Physical activity and self-rated health: interactive effects of activity in work and leisure domains. *British Journal of Health Psychology* 11(Pt 3): 533-550.

Patterson BH, Dayton CM and Graubard BI (2002) Latent class analysis of complex sample survey data: application to dietary data. *JASA* 97: 721-741.

Pietraszek A, Gregersen S and Hermansen K (2010) Alcohol and type 2 diabetes: a review. *Nutrition, Metabolism & Cardiovascular Diseases* 20(5): 366-375.

Pikhart H (2002) *Social and psychosocial determinants of self-rated health in central and eastern Europe.* Boston: Kluwer Academic Publishers.

Poortinga W (2007) The prevalence and clustering of four major lifestyle risk factors in an English adult population. *Preventive Medicine* 44(2): 124-128.

Popkin BM, Duffey K and Gordon-Larsen P (2005) Environmental influences on food choice, physical activity and energy balance. *Physiology & Behavior* 86(5): 603– 613.

Portugal. MS. DGS (2003). *Programa Nacional de Intervenção Integrada sobre Determinantes da Saúde relacionados com os Estilos de Vida*. Lisboa: Ministério da Saúde, Direcção-Geral da Saúde.

Portugal. MS. DGS (2008) *Elementos Estatísticos. Informação Geral de Saúde*. Lisboa: Direção de Serviços de Epidemiologia e Estatísticas de Saúde, Divisão de Estatísticas de Saúde, Direcção-Geral da Saúde.

Portugal. MS. DGS (2012). *Plano Nacional de Saúde 2012-2016*. Lisboa: Direção Geral da Saúde.

Portugal. MS. IDT (2009). *Plano Nacional de Redução dos Problemas Ligados ao Álcool 2009-2012*. Lisboa: Ministério da Saúde.

Portugal. MS. INSA (1981). *Inquérito Alimentar Nacional.* Lisboa: Instituto Nacional de Saúde Dr. Ricardo Jorge, Ministério da Saúde.

Portugal. MS. INSA. INE (2009). *Inquérito Nacional de saúde 2005/2006: dados gerais*. Lisboa: Instituto Nacional de Saúde Dr. Ricardo Jorge, Instituto Nacional de Estatística.

Pronk NP, Anderson LH, Crain AS et al. (2004) Meeting recommendations for multiple health lifestyle factors: prevalence, clustering and predictors among adolescents, adult and senior health plan members. *American Journal of Preventive Medicine* 27 (2 Suppl): 25-33.

R

Reedy J, Flood A, Mitrou P et al. (2010) Comparing 3 dietary pattern methods - cluster analysis, factor analysis, and index analysis - with colorectal cancer risk: the NIH-AARP Diet and Health Study. *American Journal of Epidemiology* 171(4): 479-487.

Reile R and Leinsalu M. (2013) Differentiating positive and negative self-rated health: results from a cross-sectional study in Estonia. *International Journal of Public Health* 58(4): 555–564.

Rodrigues SS, Franchini B, Graça P, de Almeida MD (2006) A new food guide for the Portuguese population: development and technical considerations. *Journal of Nutrition Education and Behavior* 38(3): 189-195.

Rohrmann S and Klein S (2003) Development and validation of a short food list to assess the intake of total fat, saturated, mono-unsaturated, polyunsaturated fatty acids and cholesterol. *European Journal of Public Health* 13(3): 262–268.

S

Sanchez A, Norman GJ, Sallis JF, Calfas KJ, Cella J, Patrick K (2007) Patterns and correlates of physical activity and nutrition behaviors in adolescents. *American Journal of Preventive Medicine* 32(2): 124-130.

Sacket DL (1979) Bias in analytical research. *Journal of Chronic Diseases* 32: 51:63.

Schafer RB, Schafer E, Dunbar M, Keith PM. (1999) Marital food interaction and dietary behavior. *Social Science & Medicine* 48(6): 787–796.

Schneider S, Huy C, Schuessler M, Diehl K, Schwarz S. (2009) Optimising lifestyle interventions: identification of health behaviour patterns by cluster analysis in a German 50+ survey. *European Journal of Public Health* 19(3): 271-277.

Schuit AJ, Van Loon AJ, Tijhuis M, Ocké M (2002) Clustering of lifestyle risk factors in a general adult population. *Preventive Medicine* 35(3): 219–224.

Shai I Jiang R, Manson JE et al. (2006) Ethnicity, obesity, and risk of type 2 diabetes in women: a 20-year follow-up study. *Diabetes Care* 29(7): 1585-1590.

Shankar A, McMunn A, Steptoe A (2010) Health-related behaviors in older adults: relationships with socioeconomic status. *American Journal of Preventive Medicine* 38 (1): 39–46.

Shaw JE, Sicree RA and Zimmet PZ (2009) Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Research and Clinical Practice* 87(1): 4-14.

Silva DA, Peres KG, Boing AF, González-Chica DA, Peres MA (2013) Clustering of risk behaviors for chronic non communicable diseases: a population-based study in Southern Brazil. *Preventive Medicine* 56(1): 20-24.

Slattery ML and Potter JD (2002) Physical activity and colon cancer: confounding or interaction? *Medicine and Science in Sports and Exercise* 34(6): 913-919.

Södergren M, Sundquist J, Johansson SE, Sundquist K (2008) Physical activity, exercise and self-rated health: a population-based study from Sweden. *BMC Public Health* 8: 1-9.

Sotres-Alvarez D, Herring AH and Siega-Riz AM (2010) Latent class analysis is useful to classify pregnant women into dietary patterns. *Journal of Nutrition* 140(12): 2253-2259.

Spring B, Moller AC and Coons MJ (2012) Multiple health behaviours: overview and implications. *Journal of Public Health* 34(Suppl 1): i3-i10.

Smith SC (2007) Multiple risk factors cardiovascular disease and diabetes mellitus. *The American Journal of Medicine* 120(3): S3-S11.

Stumvoll M, Goldstein, BJ and Van Haeften TW (2005) Type 2 diabetes: principles of pathogenesis and therapy. *Lancet* 365(9467):1333-1346.

Sudagani J and Hitman GA (2005) Diabetes Mellitus. In: Caballero B, Allen L, Prentice A (eds), 2nd ed, *Encyclopedia of Human Nutrition.* London: Queen Mary´s, 535-542.

Sullivan PF and Kendler KS (1999) The genetic epidemiology of smoking. *Nicotine and Tobacco Research* 1(Suppl): S51-S57.

T

Talamini G, Bassi, C, Falconi M et al. (1999) Alcohol and smoking as risk factors in chronic pancreatitis and pancreatic cancer. *Digestive Diseases and Sciences* 44(7): 1303-1311.

The Diabetes and Nutrition Study Group (DNSG) of the European Association for the Study of Diabetes (2000) Recommendations for the nutritional management of patients with diabetes mellitus. *European Journal of Clinical Nutrition* 54(4): 353-355.

Thiele S, Mensink GBM and Beitz R (2004) Determinants of diet quality. *Public Health Nutrition* 7(1): 29-37.

Tobias M, Jackson G, Yeh LC, Huang K (2007) Do health and unhealthy behaviours cluster in New Zealand? *Australian and New Zealand Journal of Public Health* 31(2):155–163.

Torheim LE, Barikmo I, Parr CL, Hatløy A, Ouattara F, Oshaug A (2003) Validation of food variety as an indicator of diet quality assessed with a food frequency questionnaire for Western Mali. *European Journal of Clinical Nutrition* 57(10): 1283-1291.

U

UK. Department of Health, Physical Activity, Health Improvement and Prevention (2004) *At least five a week: evidence on the impact of physical*

activity and its relationship to health: a report from the Chief Medical Officer. London: Department of Health.

UK. Food Standards Agency (2010) *Appendix B: Weighting the NDNS core sample.* Aberdeen, Scotland: Food Standard Agency.

Unden AL, Elofsson S, Andreasson A, Hillered E, Eriksson I, Brismar K (2008) Gender differences in self-rated health, quality of life, quality of care, and metabolic control in patients with diabetes. *Gender Medicine* 5(2): 162-180.

U.S. Centers for Disease Control and Prevention (2013) *Alcohol and Public Health.* Atlanta, GA: Department of Health and Human Services.

US. Centers for Disease Control and Prevention (2010) *National Health Interview Survey: The principal source of information on the health of the U.S. population*. Atlanta, GA: Department of Health and Human Services.

U.S. Centers for Disease Control and Prevention (2014) *The Health Consequences of Smoking- 50 Years of Progress.* Atlanta, GA: Department of Health and Human Services.

U.S. Centers for Disease Control and Prevention (2011) *UK Physical Activity Guidelines.* Atlanta, GA: Department of Health and Human Services.

U.S. Department of Agriculture and U.S. Department of Health and Human Services (2010). *Dietary Guidelines for Americans,* 7th edition, Washington, DC: US Government Printing Office.

V

Verger P, Lions C and Ventelou B (2009) Is depression associated with health risk related behaviour clusters in adults? *European Journal of Public Health* 19(6): 618-624.

Vermunt JK and Magidson J (2003) *Latent Class Models.* Belmont, MA: Statistical Innovations Inc.

Vermunt JK and Magidson J (2005) *Latent Gold® 4.0 User´s Guide.* Belmont, MA: Statistical Innovations Inc.

Vidal PM and Dias CM (2005) Trends and determinants of alcohol consumption in Portugal: results from the National Health Surveys 1995 to 1996 and 1998 to 1999. *Alcoholism, Clinical and Experimental Research* 29(1): 89-97.

Vink JM, Willemsen G and Boomsma DI (2003) The association of current smoking behavior with the smoking behavior of parents, siblings, friends and spouses. *Addiction* 98(7): 923–931.

Vintém JM (2008) Inquéritos Nacionais de Saúde: auto-percepção do estado de saúde: uma análise em torno da questão de género e da escolaridade. *Psicologia da saúde* 26(2): 5-16.

W

Waijers PMCM and Feskens EJM (2005) *Indexes of overall diet quality: a review of the literature* Bilthoven: Ministry of Health Welfare and Sports.

Waijers P, Feskens E and Ocké M (2007) A critical review of predefined diet quality scores. *British Journal of Nutrition* 97(2): 219-231.

Waite R, Davey M and Lynch L (2013) Self-rated health and association with ACEs. *Journal of Behavioral Health* 2(3): 197-205.

Wang WC, Worsley A and Hodgson V (2013) Classification of main meal patterns: a latent class approach. *British Journal of Nutrition* 109(12): 1-12.

Whitlock EP, Orleans T, Pender N, Allan J. (2002) Evaluating primary care behavioural counselling interventions: an evidence-based approach. *American Journal of Preventive Medicine* 22(4): 267–284.

Willi C, Bodenmann P, Ghali WA, Faris PD, Cornuz J (2007) Active smoking and the risk of type 2 diabetes: a systematic review and met-analysis. *JAMA* 298(22): 2654-2664.

World Bank (2003) *Tobacco Control at a glance.* Washington, DC: World Bank.

WHO (1994) *Lexicon of alcohol and drug terms.* Geneva: World Health Organization.

WHO (1999) *Global status report on alcohol*. Geneva: World Health Organization.

WHO (2002) *The Word Health Report: reducing risks, promoting healthy life.* Geneva: World Health Organization.

WHO (2003) *EuroHIS: Development of Common instruments for Health Interview Surveys in the European Region*. Copenhagen: World Health Organization.

WHO (2006) *Alcohol in Europe.* Geneva: WHO Regional Office for Europe.

WHO (2007) *Macro and micro environmental determinants of physical activity.* Copenhagen: WHO Regional Office for Europe.

WHO (2008a) *2008-2013 action plan for the global strategy for the prevention and control of non communicable diseases: prevent and control cardiovascular diseases, cancers, chronic respiratory diseases and diabetes.* Geneva: World Health Organization.

WHO (2008b) STEPS Instrument: Question-by-Question Guide (Core and Expanded). Geneva: World Health Organization.

WHO (2009a) *Global Health Risks: Mortality and Burden of Disease Attributable to Selected Major Risks.* Geneva: World Health Organization.

WHO (2009b) *Report on the global tobacco epidemic*. Geneva: World Health Organization.

WHO (2010a) *Global Recommendations on Physical Activity for Health.* Geneva: World Health Organization.

WHO (2010b) *Global Status Report on non communicable diseases 2010*. Copenhagen: World Health Organization.

WHO (2010c) *European Status report on Alcohol and health.* Geneva: World Health Organization.

WHO (2011) *Health for all database.* Copenhagen: World Health Organization.

WHO (2014a) *Global status report on alcohol and health*. Copenhagen: World Health Organization.

WHO (2014b) *Global Status Report on non communicable diseases 2014*. Copenhagen: World Health Organization.

Worsley A, Blasche R, Ball K et al. (2004) The relationship between education and food consumption in the 1995 Australian National Nutrition Survey. *Public Health Nutr,* 7, 649–663.

Y

Yamada C, Moriyama K and Takahashi E (2012) Self-rated health as a comprehensive indicator of lifestyle-related health status. *Environmental Health Preventive Medicine* 17(6): 457-462.

Yang CC (2006) Evaluating latent class analysis models in qualitative phenotype identification. *Computational Statistics & Data Analysis* 50(4): 1090-1104.

Yannakoulia M (2006) Eating behaviour among type 2 diabetic patients: a poorly recognized aspect in a poorly controlled disease. *Review of Diabetic Studies* 3(1): 11-16.

Z

Zimmet P, Alberti K and Shaw J (2001) Global and societal implications of the diabetes epidemic. *Nature* 414: 782-787.

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ANNEX

Questionnaire used in the fourth Portuguese National Health Interview Survey

Instrumento de notação do Sistema Estatístico Nacional (Lei nº 6/89), de 15 de Abril, de RESPOSTA OBRIGATÓRIA. Registado no INE sob o nº 9636, válido até 5-03-2006.

Todas as informações registadas neste questionário
são ABSOLUTAMENTE CONFIDENCIAIS e apenas
serão usadas de acordo com as finalidades deste Inquérito

4ºINS

QUARTO INQUÉRITO NACIONAL DE SAÚDE

QUESTIONÁRIO

Instituto Nacional de Saúde Dr. Ricardo Jorge / Instituto Nacional de Estatística

Anotações - Entrevistador(a)

_____

_____

_____

_____

_____

Anotações - Supervisor(a)

_____

_____

_____

_____

_____

_____

Nº. DE SEMANA DE REALIZAÇÃO
DESTE QUESTIONÁRIO ..... |__|__|

REG |__|	DIST |__|__|	CONC |__|__|
FRE |__|__|	SEC |__|__|__|	SBSEC |__|__|__|
U.A. |__|__|__|	Mês |__|__|	Ano |__|__|

Realização da entrevista
1 - Entrevista realizada
2 - Entrevista não realizada
3 - Entrevista para recuperação → Fim do Questionário ☐
4 - Entrevista recuperada realizada
5 - Entrevista recuperada não realizada

RESULTADO FINAL DAS ENTREVISTAS

Entrevista completa	c/ 1 visita ..... 1 c/ 2-3 visitas ..... 2 c/ 4 ou + visitas 3
Entrevista incompleta Indique a razão	c/ 1 visita ..... 4 c/ 2-3 visitas ..... 5 c/ 4 ou + visitas ..... 6 _____
Entrevista não realizada	c/ 1 visita ..... 7 c/ 2-3 visitas ..... 8 c/ 4 ou + visitas 9

☐

CAUSA DE NÃO REALIZAÇÃO

Recusa.....	01
Ausência episódica.....	02
Ausência inferior ou igual a 1 mês.....	03
Ausência de duração desconhecida.....	04
Ausência superior a 1 mês.....	05
UA habitada curto período (férias, etc.).....	06
UA não habitada.....	07
UA dupla.....	08
Não é UA.....	09
Insuficiência de listagem.....	10
Outra situação (indique).....	11
_____	

☐☐

DURAÇÃO DA ENTREVISTA
Hora de início:
Hora de fim:

1 - CARACTERIZAÇÃO SOCIODEMOGRÁFICA	1 - CARACTERIZAÇÃO SOCIODEMOGRÁFICA
QUANTAS FAMÍLIAS TEM A UA ?	⌊__⌋
QUANTOS INDIVÍDUOS TEM A (...) FAMÍLIA ?	⌊__⌋⌊__⌋
0. Quem dá a informação deste (...) indivíduo da (...) família	
Próprio 01	
Cônjuge 02	
Mãe 03	
Pai 04	
Sogro/sogra 05	⌊__⌋⌊__⌋
Avô/avó 06	
Filho/filha 07	
Neto/neta 08	
Irmão/irmã 09	
Outra pessoa de família 10	
Outra pessoa 11	
Nome	_____
Sexo	
M 1	
F 2	⌊__⌋

1 - CARACTERIZAÇÃO SOCIODEMOGRÁFICA	1 - CARACTERIZAÇÃO SOCIODEMOGRÁFICA
1. QUAL É A [SUA] NACIONALIDADE [DO(A) SR(A) _____] ? Portuguesa ..... 1 Estrangeira (indique) ..... 2 Apátrida (sem nacionalidade) .... 3 → P.3 Não sabe 9	⌊__⌋ _____ ⌊__⌋⌊__⌋ Código PAÍS
2. TEM DUPLA NACIONALIDADE? Sim (indique) ..... 1 Não ..... 2 Não sabe 9	⌊__⌋ _____ ⌊__⌋⌊__⌋ Código PAÍS
3. DIGA A [SUA] DATA DE NASCIMENTO [DO(A) SR(A) _____] . (Se não sabe: registe a data aproximada) A [sua] idade é	⌊__⌋⌊__⌋⌊__⌋⌊__⌋⌊__⌋⌊__⌋ dia mês ano ⌊__⌋⌊__⌋⌊__⌋ anos
4. QUAL É O [SEU] ESTADO CIVIL LEGAL [DO(A) SR(A) _____] ? SOLTEIRO(A) ..... 1 CASADO(A) ..... 2 CASADO(A) (na situação de separado(a) legalmente de pessoas e bens …….. 3 DIVORCIADO (A) ..... 4 VIÚVO(A) ..... 5 Não sabe 9	⌊__⌋
(Só para pessoas de 14 e mais anos de idade) 5. [O(A) SR(A) _____] VIVE CONJUGALMENTE COM ALGUÉM ? Sim ..... 1 Não ..... 2 Não sabe 9	⌊__⌋

1 - CARACTERIZAÇÃO SOCIODEMOGRÁFICA	1 - CARACTERIZAÇÃO SOCIODEMOGRÁFICA
6. QUAL O NÍVEL DE ENSINO MAIS ELEVADO QUE [O(A) SR(A) ____] FREQUENTA OU, SE JÁ NÃO ESTUDA, QUE FREQUENTOU? Nenhum ..... 01 → P.8 Ensino básico – 1º ciclo ..... 02 Ensino básico – 2º ciclo ..... 03 Ensino básico – 3º ciclo ..... 04 Ensino secundário ..... 05 Ensino pós-secundário ..... 06 Ensino superior – Bacharelato ..... 07 Ensino superior – Licenciatura ..... 08 Ensino superior – Mestrado ..... 09 Ensino superior – Doutoramento ... 10 Não sabe ..... 99 → P.8	☐☐
7. QUANTOS ANOS DE ESCOLARIDADE COMPLETOU, COM APROVEITAMENTO ? Não sabe ……..... 99	☐☐
8. DAS SEGUINTES CATEGORIAS, QUAL A QUE MELHOR DESCREVE A [SUA] OCUPAÇÃO PRINCIPAL [DO(A) SR(A) _____], NAS <u>DUAS ÚLTIMAS SEMANAS</u> ? EXERCE UMA PROFISSÃO, TEM UM TRABALHO, MESMO QUE NÃO REMUNERADO PARA UMA PESSOA DE FAMÍLIA ..... 01 É ALUNO/ESTUDANTE ..... 02 → P.15 ESTÁ A CUMPRIR O SERVIÇO MILITAR …… 03 → P.15 OCUPA-SE DAS TAREFAS DOMÉSTICAS (DONA/O DE CASA) ..... 04 → P.15 **NÃO TEVE OCUPAÇÃO PORQUE ESTÁ:** DESEMPREGADO(A) HÁ MENOS DE 1 ANO ..... 05 DESEMPREGADO(A) HÁ 1 ANO E MAIS ..... 06 REFORMADO(A), APOSENTADO(A)..... 07 PERMANENTEMENTE INCAPACITADO(A) ..... 08 DOENTE HÁ 3 MESES OU MAIS..... 09 DOENTE HÁ MENOS DE 3 MESES ..... 10 À PROCURA DO 1º EMPREGO ..... 11 → P.15 EM ESTÁGIO NÃO REMUNERADO ..... 12 DE FÉRIAS ..... 13 IMPEDIDO DEVIDO A CONDIÇÕES ATMOSFÉRICAS ..... 14 NOUTRA SITUAÇÃO DE INACTIVIDADE (INDIQUE) ..... 15 Não sabe …….. 99	☐☐ _____ _____

1 - CARACTERIZAÇÃO SOCIODEMOGRÁFICA	1 - CARACTERIZAÇÃO SOCIODEMOGRÁFICA
9. QUAL É [ERA] A [SUA] PROFISSÃO PRINCIPAL [DO(A) SR(A) _____] ? (Indique) Não sabe ..... 0009 Não tem ou nunca teve profissão ... 0007 → P.15	_____ |_|_|_|_| Código PROF
10. QUE TIPO DE TRABALHO FAZ [FAZIA] (PRINCIPAIS TAREFAS) ? (Actividade principal) (Registe uma descrição precisa das principais tarefas)	_____ _____
11. E QUAL É [ERA] A [SUA] SITUAÇÃO NESSA PROFISSÃO [DO(A) SR(A_____] ? TRABALHA POR CONTA DE OUTREM ..... 1 TRABALHA POR CONTA PRÓPRIA ……..... 2 TRABALHA POR CONTA PRÓPRIA COMO EMPREGADOR ..... 3 TRABALHA PARA UMA PESSOA DE FAMÍLIA SEM RECEBER ..... 4 OUTRA SITUAÇÃO (INDIQUE) ..... 5 Não sabe …… 9	|_| _____
12. DIGA-ME O Nº HABITUAL DE HORAS SEMANAIS QUE TRABALHA [TRABALHAVA] NA PROFISSÃO QUE INDICOU ? (01 a 90) Não sabe 99	|_|_| horas
13. QUAL O TIPO DE ACTIVIDADE A QUE SE DEDICA [DEDICAVA) O ESTABELECIMENTO, ORGANISMO EM QUE TRABALHA [TRABALHAVA] ? (Indique) Não sabe 99	_____ |_|_| Código AE
(Faça esta pergunta apenas quando P.11 = 3) 14. QUANTOS TRABALHADORES EXERCEM [EXERCIAM] ACTIVIDADE NO ESTABELECIMENTO (UNIDADE LOCAL) ONDE TRABALHA [TRABALHAVA] ? Até 9 trabalhadores ..... 1 10 a 24 trabalhadores ..... 2 25 a 499 trabalhadores ..... 3 500 ou mais trabalhadores ..... 4 Não sabe 9	|_|

1 - CARACTERIZAÇÃO SOCIODEMOGRÁFICA	1 - CARACTERIZAÇÃO SOCIODEMOGRÁFICA
DIGA-ME AGORA, POR FAVOR.	
15. [O(A) SR(A) _____] SEMPRE RESIDIU EM PORTUGAL ? Sim ..... 1 Não ..... 2 Não sabe 9	⌊_⌋
16. É NATURAL DE QUE PAÍS ? Portugal ..... 1 Outro (indique) ..... 2 Não sabe ..... 9 → A.seg. Nota: Se registou 1 em P.15 e P.16, não faça as perguntas seguintes e inicie a A. Seg. Se registou 1 em P.15 e 2 em P.16, indique qual o país e faça P.19 Se registou 2 em P.15 e 1 em P.16, faça apenas as perguntas P.17 e P.18 Se registou 2 em P.15 e P.16, indique qual o país e faça P.19	⌊_⌋ _____ ⌊_⌋⌊_⌋ Código PAÍS
17. QUANTOS ANOS É QUE ESTEVE EMIGRADO(A) ? Menos de 1 ano ..... 000 Não sabe 999	⌊_⌋⌊_⌋⌊_⌋ anos
18. HÁ QUANTOS ANOS É QUE REGRESSOU ? Menos de 1 ano ..... 000 Não sabe …..... 999 Passe → A.seg.	⌊_⌋⌊_⌋⌊_⌋ anos
19. HÁ QUANTOS ANOS RESIDE EM PORTUGAL ? Menos de 1 ano ..... 000 Não sabe 999	⌊_⌋⌊_⌋⌊_⌋ anos

2 - INFORMAÇÕES GERAIS DE SAÚDE	2 - INFORMAÇÕES GERAIS DE SAÚDE
(Pergunta para pessoas até 14 anos com informação a ser dada por outrem e para pessoas de 15 e mais anos, sendo o próprio a responder) 1. DE UMA MANEIRA GERAL, COMO CONSIDERA O [SEU] ESTADO DE SAÚDE [DO(A) _____] ? MUITO BOM ..... 1 BOM ..... 2 RAZOÁVEL ..... 3 MAU ..... 4 OU MUITO MAU ..... 5 Não sabe…… 9	⌊_⌋
As duas perguntas seguintes são para pessoas com 6 e mais anos. (No caso de se tratar de uma grávida, pergunte a altura e o peso antes da gravidez)	
2. QUAL É A [SUA] ALTURA [DO(A) SR(A) _____] SEM SAPATOS ? Não sabe 999	⌊_ _ _⌋ cm
3. QUANTO PESA [O(A) SR(A) _____] SEM ROUPAS E SEM SAPATOS ? Não sabe 999	⌊_ _ _⌋ kg

2 - INFORMAÇÕES GERAIS DE SAÚDE	2 - INFORMAÇÕES GERAIS DE SAÚDE
4. DE QUAL DAS ENTIDADES QUE VOU REFERIR É [O (A) SR(A) _____] BENEFICIÁRIO EM MATÉRIA DE CUIDADOS DE SAÚDE ? ADSE (ASSIST. DOENÇA SERV. ESTADO) ..... 01 SSMJ (SERV. MINIST. JUSTIÇA) ..... 02 ADMA (ASSIST. DOENÇA MILIT. ARMADA) ..... 03 ADFA (ASSIST. DOENÇA MILIT. FORÇA AÉREA) ..... 04 ADME (ASSIST. DOENÇA MILIT.EXÉRCITO) ..... 05 SAD/PSP (SERV. ASSIST. DOENÇA À PSP)..... 06 SAD/GNR (SERV. ASSIST. DOENÇA À GNR) ..... 07 SAMS (SERV. ACÇÃO MÉD. SOC. BANCÁRIOS) ..... 08 SERVIÇO NACIONAL DE SAÚDE ..... 09 OUTROS (indique)..... 10 SERVIÇO REGIONAL DE SAÚDE ..... 11 Não sabe ..... 99 (Quando não indicar nenhum subsistema deverá ser considerado beneficiário do Serviço Nacional de Saúde)	⌊_⌊_⌋ _____
5. E DOS SERVIÇOS QUE VOU REFERIR, A QUAL É QUE RECORRE MAIS VEZES PARA UTILIZAÇÃO DE BENEFÍCIOS ? ADSE (ASSIST. DOENÇA SERV. ESTADO) ..... 01 SSMJ (SERV. MINIST. JUSTIÇA) ..... 02 ADMA (ASSIST. DOENÇA MILIT. ARMADA) ..... 03 ADFA (ASSIST. DOENÇA MILIT. FORÇA AÉREA) ..... 04 ADME (ASSIST. DOENÇA MILIT.EXÉRCITO) ..... 05 SAD/PSP (SERV. ASSIST. DOENÇA À PSP) ..... 06 SAD/GNR (SERV. ASSIST. DOENÇA À GNR) ..... 07 SAMS (SERV. ACÇÃO MÉD. SOC. BANCÁRIOS) ..... 08 SERVIÇO NACIONAL DE SAÚDE ..... 09 OUTROS (indique) ..... 10 Não utiliza ..... 11 SERVIÇO REGIONAL DE SAÚDE ..... 12 Não sabe 99	⌊_⌊_⌋ _____
6. E [O (A) SR(A) _____] TEM ALGUM SEGURO DE SAÚDE ? Sim ..... 1 Não ..... 2 → P.8 Não sabe ……..... 9 → P. 8	⌊_⌋

2 - INFORMAÇÕES GERAIS DE SAÚDE	2 - INFORMAÇÕES GERAIS DE SAÚDE
7. QUAIS OS RISCOS CUJA COBERTURA ELE LHE GARANTE ? Apenas internamento ..... 1 Internamento, Consultas e Meios Complementares de Diagnóstico e Terapêutica ..... 2 Internamento, Consultas e Meios Complementares de Diagnóstico e Terapêutica e Medicamentos ..... 3 Outras combinações de riscos ..... 4 Todos os riscos ..... 5 Não sabe 9	⌊_⌋
As duas <u>perguntas seguintes</u> são para pessoas com <u>18 e mais anos</u>.	
8. [O (A) SR(A) _____] JÁ ALGUMA VEZ DEU SANGUE ? Sim …..... 1 Não ..... 2 → A.Seg. Não sabe ..... 9 → A. Seg	⌊_⌋
9. QUANTAS VEZES DEU, NOS ÚLTIMOS 12 MESES ? (Entre 0 e 4, se do sexo masculino; entre 0 e 3, se do sexo feminino) Não sabe 9	⌊_⌋ vezes

3 – INCAPACIDADE TEMPORÁRIA	3 - INCAPACIDADE TEMPORÁRIA
AS PERGUNTAS QUE VOU FAZER EM SEGUIDA SÃO SOBRE ALGUNS ASPECTOS DA SAÚDE DAS PESSOAS, NAS ÚLTIMAS DUAS SEMANAS. O QUE NOS INTERESSA SABER É SE AS PESSOAS ESTIVERAM DOENTES, SE SOFRERAM ALGUM ACIDENTE OU SE TIVERAM OUTROS PROBLEMAS RELACIONADOS COM A SAÚDE.	
(Esta pergunta é só para pessoas de 1 e mais anos) 1. [O (A) SR(A) _____], NESTAS DUAS SEMANAS, QUANTOS DIAS DEIXOU DE FAZER <u>ALGUMA</u> DAS COISAS QUE HABITUALMENTE FAZ, SEJA EM CASA, NO TRABALHO OU NO TEMPO LIVRE [NO DIA-A-DIA], <u>DEVIDO A DOENÇA, ACIDENTE, VIOLÊNCIA OU A MOTIVOS RELACIONADOS COM A SAÚDE</u> (TAIS COMO CONSULTAS, ANÁLISES, RADIOGRAFIAS,TRATAMENTOS, INTERNAMENTOS, ETC.) ? (00 a 14) Nenhum dia ..... 00 → P.4 Não sabe ..... 99 → P.4	⌊_⌊_⌋ dias
(Esta pergunta é só para activos e estudantes) 2. QUANTOS DIAS É QUE FALTOU AO TRABALHO [À ESCOLA] ? Não sabe 99	⌊_⌊_⌋
(Esta pergunta é só para pessoas de 1 e mais anos) 3. E QUANTOS TEVE DE FICAR DE CAMA, TODO O DIA OU A MAIOR PARTE DO DIA ? (<u>Inclua os dias de internamento</u>) Se esteve de cama ..... 01 a 14 → P.5 Não esteve de cama ..... 00 → P.5 Não sabe ..... 99 → P.5	⌊_⌊_⌋ dias

3 - INCAPACIDADE TEMPORÁRIA	3 - INCAPACIDADE TEMPORÁRIA
(Faça esta pergunta apenas quando P.1 = 00 ou 99) 4. DIGA-ME, ENTÃO, SE NESTAS DUAS SEMANAS [O (A) SR(A) _____] SE SENTIU MAL OU ESTEVE ADOENTADO(A) ? Sim ..... 1 Não ..... 2 → A. seg. Não sabe …… 9 → A. seg.	⌊_⌋
5. O QUE TEVE ? (Indique) NOTAS: 1 - Se houver mais do que uma doença, registe a que originou mais dias de incapacidade. 2 - Se houve mais do que 1 lesão, descreva-as. 3 - Se o entrevistado não sabe o nome da doença ou da lesão, registe os primeiros 4 sintomas relatados e coloque um asterisco (*) logo a seguir ao sintoma que o entrevistado referir que mais o incomodou Não sabe ..... 000 0 9 → A. seg Registe o tipo 1 - Acidente ocorrido nas duas últimas semanas 2 – Lesão provocada intencionalmente por outra pessoa (violência) 3 - Parto normal → A. seg. 4 - Outros → P. 7	_____ _____ _____ ⌊_⌋⌊_⌋⌊_⌋ ⌊_⌋ ⌊_⌋ Código PAT Cód. INSA ⌊_⌋ Tipo ⌊_⌋
6. QUE TIPO DE ACIDENTE OU LESÃO SOFREU, ENTÃO, NESTAS ÚLTIMAS DUAS SEMANAS ? COMO FOI ? DESCREVA, SE FAZ FAVOR. (Quem, onde e como ?) Não sabe 000 9	⌊_⌋⌊_⌋⌊_⌋ ⌊_⌋ Código ACI _____ _____

3 - INCAPACIDADE TEMPORÁRIA	3 - INCAPACIDADE TEMPORÁRIA
7. EM RELAÇÃO AO PROBLEMA QUE REFERIU O QUE É QUE [O (A) SR (A)_____] FEZ NESTAS DUAS SEMANAS? Sim ..... 1 Não ..... 2 Não sabe 9	
TRATAMENTOS CASEIROS (CHÁS, ERVAS OU OUTROS)	☐
MODIFICOU A ALIMENTAÇÃO	☐
TOMOU MEDICAMENTOS QUE JÁ CONHECIA	☐
TOMOU MEDICAMENTOS INDICADOS POR PESSOAS CONHECIDAS	☐
TOMOU MEDICAMENTOS INDICADOS POR MÉDICO.....	☐
FEZ ACUPUNCTURA	☐
TRATAMENTOS HOMEOPÁTICOS	☐
TRATAMENTOS OSTEOPÁTICOS	☐
TRATAMENTOS NATUROPÁTICOS	☐
FEZ TRATAMENTOS DE FITOTERAPIA	☐
TRATAMENTOS DE QUIROPRAXIA	☐
FEZ OUTRA COISA (Indique)	☐
	_____
(Se 2 em todas as alternativas, registe 1 em «Não fez nada»; caso contrário, registe 2)	
Não fez nada	☐

3 - INCAPACIDADE TEMPORÁRIA	3 - INCAPACIDADE TEMPORÁRIA
8. AINDA EM RELAÇÃO A ESSE PROBLEMA, A QUEM RECORREU ? Sim ..... 1 Não ..... 2 Não sabe ..... 9 MÉDICO ..... ENFERMEIRO ..... FARMACÊUTICO ..... TÉCNICO DE ACUPUNCTURA ..... HOMEOPATA ..... OSTEOPATA ..... NATUROPATA ..... FITOTERAPEUTA ..... TÉCNICO DE QUIROPRAXIA ..... ERVANÁRIO ..... ENDIREITA, CURANDEIRO, VIRTUOSO ..... OUTRO TÉCNICO DE SAÚDE (Indique) ..... (Se 2 em todas as alternativas, registe 1 em «Não recorreu a ninguém»; caso contrário, registe 2) Não recorreu a ninguém ..... Se não consultou um médico → A. seg.	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
9. A QUE MÉDICO FOI ? ONDE FOI A CONSULTA ? (Indique) Não sabe 99	_____ _____ _____ ☐☐ Código CUID

4 - INCAPACIDADE DE LONGA DURAÇÃO	4 - INCAPACIDADE DE LONGA DURAÇÃO
<u>Área a aplicar somente nas semanas 1 a 13</u>	
Para as pessoas com <u>10 e mais anos</u>	
AS PERGUNTAS QUE SE SEGUEM REFEREM-SE A SITUAÇÕES MUITO PROLONGADAS E CRÓNICAS.	
1. [O(A) SR(A) _____] ESTÁ SEMPRE ACAMADO(A), ISTO É, NÃO CONSEGUE LEVANTAR-SE DA CAMA MESMO QUE POSSA HAVER ALGUÉM QUE O(A) AJUDE A FAZÊ-LO ? Sim …… 1 Não …… 2 → P.3 Não sabe …… 9 → P.3	☐
2. DIGA-ME, TAMBÉM, SE CONSEGUE MUDAR DE POSIÇÃO (NA CAMA)? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe ..... 9 Se respondeu a esta pergunta → P.20	☐
3. [O(A) SR(A) _____] ESTÁ SENTADO (A) NUMA CADEIRA (não uma cadeira de rodas) TODO O DIA (excepto a noite), ISTO É, NÃO CONSEGUE ANDAR MESMO QUE POSSA HAVER ALGUÉM QUE O(A) AJUDE ? Sim ..... 1 → P.20 Não ..... 2 Não sabe 9	☐

4 - INCAPACIDADE DE LONGA DURAÇÃO	4 - INCAPACIDADE DE LONGA DURAÇÃO
4. [O(A) SR(A) _____] ESTÁ LIMITADO(A) À SUA CASA [APARTAMENTO] [ANDAR] (inclua o jardim, no caso de haver) ? Sim ..... 1 Não ..... 2 Não sabe 9	⌊_⌋
5. QUE DISTÂNCIA [O (A) SR(A) _____] CONSEGUE ANDAR, <u>EM SÍTIO PLANO</u>, SEM PARAR E SEM GRANDE DESCONFORTO [INCÓMODO, MAL-ESTAR] ? - 200 METROS OU MAIS ..... 1 → P.8 - MAIS QUE UNS PASSOS, MAS MENOS DO QUE 200 METROS ..... 2 → P.8 - APENAS UNS POUCOS PASSOS ..... 3 → P.8 - Não consegue andar, mas desloca-se sozinho em cadeira de rodas ..... 4 - Não consegue andar, mas desloca-se, com ajuda de outrem , em cadeira de rodas ..... 5 Não sabe ..... 9 → P.8	⌊_⌋
6. E CONSEGUE MUDAR DA CAMA PARA A CADEIRA DE RODAS E DA CADEIRA DE RODAS PARA A CAMA ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	⌊_⌋
Atenção: Se registou 1 em P.4 e 4 ou 5 em P.5, faça apenas P.13, P.14 e P.16 a P.25	
7. CONSEGUE MUDAR DA CADEIRA DE RODAS PARA UM CARRO E DE UM CARRO PARA A CADEIRA DE RODAS ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	⌊_⌋

4 - INCAPACIDADE DE LONGA DURAÇÃO	4 - INCAPACIDADE DE LONGA DURAÇÃO
Atenção: Se registou 1 em P.4 , faça apenas P.10 a P.25	
8. DIGA-ME. [O(A) SR(A) _____] CONSEGUE UTILIZAR TRANSPORTES PÚBLICOS ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	☐
9. E IR ÀS COMPRAS ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	☐
Atenção: Se registou 2 em P.4 e 4 ou 5 em P.5, faça apenas P.13, P.14 e P.16 a P.25	
10. [O(A) SR(A) _____] CONSEGUE SUBIR E DESCER UM LANÇO DE ESCADAS DE 12 DEGRAUS (UM 1º ANDAR) ? SEM DESCANSAR ..... 1 PARANDO PARA DESCANSAR ..... . 2 OU NÃO CONSEGUE MESMO PARANDO PARA DESCANSAR ..... 3 Não sabe 9	☐
11. [O(A) SR(A) _____] CONSEGUE DEITAR-SE E LEVANTAR-SE DA CAMA ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe ……..…..... 9	☐

4 - INCAPACIDADE DE LONGA DURAÇÃO	4 - INCAPACIDADE DE LONGA DURAÇÃO
12. [O(A) SR(A) _____] CONSEGUE SENTAR-SE E LEVANTAR-SE DE UMA CADEIRA ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	⌊_⌋
13. [O(A) SR(A) _____] CONSEGUE IR À RETRETE E UTILIZÁ-LA ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	⌊_⌋
14. [O(A) SR(A) _____] CONSEGUE ARRUMAR E LIMPAR A CASA ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	⌊_⌋
DIGA-ME AGORA, POR FAVOR.	
15. [O(A) SR(A) _____] QUANDO ESTÁ EM PÉ, CONSEGUE DOBRAR-SE E APANHAR, POR EXEMPLO, UM SAPATO DO CHÃO ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	⌊_⌋
16. E CONSEGUE PINÇAR, ISTO É, APANHAR UM OBJECTO PEQUENO ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	⌊_⌋

4 - INCAPACIDADE DE LONGA DURAÇÃO	4 - INCAPACIDADE DE LONGA DURAÇÃO
17. [O(A) SR(A) _____] CONSEGUE VESTIR-SE E DESPIR-SE ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	☐
18. CONSEGUE PREPARAR REFEIÇÕES ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	☐
19. DIGA-ME, AINDA. CONSEGUE LAVAR-SE TOMANDO BANHO ? SOZINHO, SEM DIFICULDADE ..... 1 → P.21 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	☐
20. CONSEGUE LAVAR AS MÃOS E A CARA? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	☐
21. E [O(A) SR(A) _____] CONSEGUE COMER (CORTAR A COMIDA, LEVAR OS ALIMENTOS E BEBIDAS À BOCA) ? SOZINHO, SEM DIFICULDADE ..... 1 SOZINHO, MAS COM DIFICULDADE ..... 2 SÓ COM AJUDA ..... 3 Não sabe 9	☐

4 - INCAPACIDADE DE LONGA DURAÇÃO	4 - INCAPACIDADE DE LONGA DURAÇÃO
PARA ACABAR ESTAS PERGUNTAS SOBRE DIFICULDADES QUE ALGUMAS PESSOAS TÊM, DIGA-ME:	
22. [O(A) SR(A) _____] CONSEGUE OUVIR UM PROGRAMA DE TV OU DE RÁDIO ? (sem ou com aparelho auditivo) NUM VOLUME QUE NÃO INCOMODE AS OUTRAS PESSOAS ..... 1 SÓ COM O VOLUME ALTO ..... 2 OU NÃO CONSEGUE OUVIR MESMO COM VOLUME ALTO ..... 3 Não sabe 9	☐
23. [O(A) SR(A) _____] CONSEGUE VER DE FORMA A RECONHECER UM AMIGO ? (Sem ou com óculos ou lentes de contacto) A UMA DISTÂNCIA DE 4 METROS, DIGAMOS, DO OUTRO LADO DA RUA ..... 1 A UMA DISTÂNCIA DE 1 METRO ..... 2 OU NÃO CONSEGUE MESMO À DISTÂNCIA DE 1 METRO ..... 3 Não sabe 9	☐
24. [O(A) SR(A) _____] TEM DIFICULDADES A FALAR ? Sim ..... 1 Não ..... 2 Não sabe 9	☐

4 - INCAPACIDADE DE LONGA DURAÇÃO	4 - INCAPACIDADE DE LONGA DURAÇÃO
Faça esta pergunta quando ocorra pelo menos uma das seguintes situações: P.1 = 1, P.3 = 1, P.4 = 1, P.5 = 2, 3, 4 ou 5, P.6 a P.23 = 2 ou 3, P.24 = 1. Caso contrário → A. Seg.	
25. EM RELAÇÃO AO(S) PROBLEMA(S) QUE REFERIU, DIGA-ME QUAL(QUAIS) O(S) MOTIVO(S) ? Sim ..... 1 Não ..... 2 → A. Seg. Não sabe ..... 9 → A. Seg.	
ACIDENTE DE VIAÇÃO.....	☐
ACIDENTE DE VIAÇÃO EM TRABALHO	☐
ACIDENTE DE TRABALHO	☐
ACIDENTE DOMÉSTICO E DE LAZER	☐
OUTRO ACIDENTE (INDIQUE)	☐
	_____
	_____
	_____
VIOLÊNCIA	☐
DOENÇA PROFISSIONAL	☐
OUTRA DOENÇA	☐

4 - INCAPACIDADE DE LONGA DURAÇÃO	4 - INCAPACIDADE DE LONGA DURAÇÃO
Atenção:	
Se houve acidente de viação, registe a lesão provocada	_____ _____ _____ _____ |_|_|_| |_| |_| Código PAT Cód. INSA |_|
Se houve acidente de viação em trabalho, registe a lesão provocada	_____ _____ _____ _____ |_|_|_| |_| |_| Código PAT Cód. INSA |_|
Se houve acidente de trabalho, registe a lesão provocada	_____ _____ _____ _____ |_|_|_| |_| |_| Código PAT Cód. INSA |_|
Se houve acidente doméstico e de lazer, registe a lesão provocada	_____ _____ _____ _____ |_|_|_| |_| |_| Código PAT Cód. INSA |_|

4 - INCAPACIDADE DE LONGA DURAÇÃO	4 - INCAPACIDADE DE LONGA DURAÇÃO
Se houve outro acidente, registe a lesão provocada	_____ _____ _____ _____ |_|_|_| |_| |_| Código PAT Cód. INSA |_|
Se houve violência, registe a lesão provocada	_____ _____ _____ _____ |_|_|_| |_| |_| Código PAT Cód. INSA |_|
Se houve doença profissional, registe qual	_____ _____ _____ _____ |_|_|_| |_| |_| Código PAT Cód. INSA |_|
Se houve outra doença, registe qual	_____ _____ _____ _____ |_|_|_| |_| |_| Código PAT Cód. INSA | |

5 - DOENÇAS CRÓNICAS	5 - DOENÇAS CRÓNICAS
AS PERGUNTAS QUE VOU PASSAR A FAZER SÃO SOBRE ALGUMAS DOENÇAS CRÓNICAS.	
1. [O (A) SR(A) _____] TEM OU JÁ TEVE <u>DIABETES</u> (<u>AÇÚCAR NO SANGUE</u>) ? Sim ..... 1 Não ..... 2 → P.10 Não sabe ..... 9 → P.10	☐
2. DESDE QUE IDADE TEM ESTA DOENÇA ? (Se não sabe, registe a idade aproximada)	☐☐☐ anos
3. FOI ALGUM(A) MÉDICO(A) OU ENFERMEIRO(A) QUE LHE DISSE [AO (A) SR(A) _____] TER ESTA DOENÇA ? Sim ..... 1 Não ..... 2 Não sabe 9	☐
4. TEVE ESTE PROBLEMA NOS ÚLTIMOS 12 MESES ? Sim, pela primeira vez ..... 1 Não ..... 2 Sim, mas já tinha antes .... 3 Não sabe 9	☐
5. DIGA-ME ENTÃO QUE MEDICAMENTOS TOMOU OU QUE TRATAMENTO FEZ NOS ÚLTIMOS 12 MESES PARA ESTA DOENÇA ? Sim ..... 1 Não ..... 2 Não sabe ..... 9 Dieta ..... Comprimidos ..... Insulina	☐ ☐ ☐

5 - DOENÇAS CRÓNICAS	5 - DOENÇAS CRÓNICAS
6. QUANTAS VEZES, NOS ÚLTIMOS 12 MESES, PRECISOU DE RECORRER AO SERVIÇO DE URGÊNCIA DO HOSPITAL OU À URGÊNCIA DO CENTRO DE SAÚDE, DEVIDO A AÇÚCAR A MAIS OU A MENOS? Nenhuma vez ..... 00 Não sabe 99	⌊_⌋⌊_⌋ vezes
7. DIGA-ME AINDA. [O (A) SR(A) _____] TEM O GUIA DO DO DIABÉTICO (LIVRO VERDE DO DIABÉTICO) ? Sim ..... 1 Não ..... 2 → P.10 Não sabe ..... 9 → P.10	⌊_⌋
8. ONDE LHE DERAM ESSE GUIA (LIVRO VERDE) ? No Centro de Saúde ..... 1 No Hospital ..... 2 Não sabe ……... 9	⌊_⌋
9. ONDE É QUE COSTUMA UTILIZÁ-LO ? No médico assistente ..... 1 Na farmácia ..... 2 No hospital ..... 3 Não costuma utilizá-lo ..... 4 Não sabe 9	⌊_⌋

5 - DOENÇAS CRÓNICAS	5 - DOENÇAS CRÓNICAS
10. [O (A) SR(A) _____] TEM OU JÁ TEVE <u>ASMA</u> ? Sim ..... 1 Não ..... 2 → P.16 Não sabe ..... 9 → P.16	☐
11. DESDE QUE IDADE TEM ESTA DOENÇA ? (Se não sabe, registe a idade aproximada)	☐☐☐ anos
12. FOI ALGUM(A) MÉDICO(A) OU ENFERMEIRO(A) QUE DISSE [AO (A) SR(A) _____] TER ESTA DOENÇA ? Sim ..... 1 Não ..... 2 Não sabe 9	☐
13. TEVE ESTE PROBLEMA NOS ÚLTIMOS 12 MESES ? Sim, pela primeira vez ..... 1 Não ..... 2 Sim, mas já tinha antes .... 3 Não sabe 9	☐
14. E TOMOU MEDICAMENTOS OU FEZ TRATAMENTO NOS ÚLTIMOS 12 MESES PARA ESTA DOENÇA ? Sim ..... 1 Não ..... 2 Não sabe 9	☐
15. QUANTAS VEZES, NOS ÚLTIMOS 12 MESES, PRECISOU DE RECORRER AO SERVIÇO DE URGÊNCIA DO HOSPITAL OU À URGÊNCIA DO CENTRO DE SAÚDE, DEVIDO À ASMA ? Nenhuma vez ..... 00 Não sabe 99	☐☐ vezes

5 - DOENÇAS CRÓNICAS	5 - DOENÇAS CRÓNICAS
16. [O (A) SR(A) _____] TEM OU JÁ TEVE <u>TENSÃO ARTERIAL ALTA</u> (HIPERTENSÃO ARTERIAL) ? Sim ..... 1 Não ..... 2 → P.21 Não sabe ..... 9 → P.21	☐
17. DESDE QUE IDADE ? (Se não sabe, registe a idade aproximada)	☐☐☐ anos
18. FOI ALGUM(A) MÉDICO(A) OU ENFERMEIRO(A) QUE DISSE [AO (A) SR(A) _____] TER TENSÃO ARTERIAL ALTA ? Sim ..... 1 Não ..... 2 Não sabe 9	☐
19. TEVE ESTE PROBLEMA NOS ÚLTIMOS 12 MESES ? Sim, pela primeira vez ..... 1 Não ..... 2 Sim, mas já tinha antes .... 3 Não sabe 9	☐
20. DIGA-ME ENTÃO….. QUE MEDICAMENTOS TOMOU OU QUE TRATAMENTOS FEZ NOS ÚLTIMOS 12 MESES PARA ESTA DOENÇA ? Sim .....:..... 1 Não …..... 2 Não sabe ..... 9 Dieta ..... Comprimidos	 ☐ ☐

5 - DOENÇAS CRÓNICAS	5 - DOENÇAS CRÓNICAS
VOU FAZER AINDA MAIS ALGUMAS PERGUNTAS SOBRE OUTRAS DOENÇAS CRÓNICAS.	
21. [O (A) SR(A) _____] TEM OU JÁ TEVE ALGUMA <u>DOR CRÓNICA</u> (DOR CONSTANTE OU REPETITIVA DURANTE, PELO MENOS, TRÊS MESES) ? Sim ..... 1 Não ..... 2 → P.24 Não sabe ..... 9 → P.24	☐
22. CONSIDERANDO A QUE O(A) INCOMODA MAIS, EM QUE ZONA DO CORPO É QUE COSTUMA TER ESSA DOR ? Nas costas (em baixo nas cruzes) ..... 1 Nas articulações (joelhos, punhos, ancas) ..... 2 Na cabeça (dor de cabeça, enxaqueca) ..... 3 Outra (indique) ..... 4 Não sabe 9	☐ _____
23. QUANTOS DIAS É QUE FALTOU AO TRABALHO [À ESCOLA] DEVIDO A ESSA DOR, NOS ÚLTIMOS 12 MESES ? Não sabe 999	☐☐☐

5 - DOENÇAS CRÓNICAS	5 - DOENÇAS CRÓNICAS
24. [O (A) SR(A) _____] TEM OU JÁ TEVE <u>ALGUMA OU ALGUMAS DESTAS OUTRAS DOENÇAS CRÓNICAS QUE VOU REFERIR</u> ? Sim ..... 1 Não ..... 2 Não sabe 9	
1. DOENÇA REUMÁTICA (OSTEOARTROSE, TENDINITE)	☐
2. OSTEOPOROSE	☐
3. GLAUCOMA	☐
4. RETINOPATIA (DOENÇA DA RETINA)	☐
5. TUMOR MALIGNO OU CANCRO	☐
6. PEDRA NOS RINS.....	☐
7. INSUFICIÊNCIA RENAL.....	☐
8. ANSIEDADE CRÓNICA.....	☐
9. FERIDA CRÓNICA (ÚLCERAS DA PERNA, ESCARAS).....	☐
10. ENFISEMA (DOENÇA PULMONAR OBSTRUTIVA CRÓNICA), BRONQUITE CRÓNICA.....	☐
11. AVC (ACIDENTE VASCULAR CEREBRAL).....	☐
12. OBESIDADE.....	☐
13. DEPRESSÃO…….....	☐
14. ENFARTE DO MIOCÁRDIO.....	☐
15. OUTRA (indique).....	☐
	_____
Nota: - Se registou 2 ou 9 em todas as doenças → A. Seg. - Se registou 1 em alguma(s) doença(s) faça as perguntas seguintes correspondentes a essa(s) doença(s)	

5 - DOENÇAS CRÓNICAS		5 - DOENÇAS CRÓNICAS
25. DESDE QUE IDADE TEM ESTA DOENÇA ? (Se não sabe, registe a idade aproximada)	Doença 1 …...	___ anos
	Doença 2	___ anos
	Doença 3	___ anos
	Doença 4	___ anos
	Doença 5	___ anos
	Doença 6	___ anos
	Doença 7	___ anos
	Doença 8	___ anos
	Doença 9	___ anos
	Doença 10	___ anos
	Doença 11	___ anos
	Doença 12	___ anos
	Doença 13	___ anos
	Doença 14	___ anos
	Doença 15	___ anos
26. FOI ALGUM(A) MÉDICO(A) OU ENFERMEIRO(A) QUE DISSE [AO (A) SR(A) _____] TER ESTA(S) DOENÇA(S) ? Sim ..... 1 Não ..... 2 Não sabe 9		
	Doença 1	☐
	Doença 2	☐
	Doença 3	☐
	Doença 4	☐
	Doença 5	☐
	Doença 6	☐
	Doença 7	☐
	Doença 8	☐
	Doença 9	☐
	Doença 10	☐
	Doença 11	☐
	Doença 12	☐
	Doença 13	☐
	Doença 14	☐
	Doença 15	☐

5 - DOENÇAS CRÓNICAS	5 - DOENÇAS CRÓNICAS
27. TEVE ESTE(S) PROBLEMA(S) NOS ÚLTIMOS 12 MESES ? Sim, pela primeira vez ..... 1 Não ..... 2 Sim, mas já tinha antes .... 3 Não sabe 9	
Doença 1	☐
Doença 2	☐
Doença 3	☐
Doença 4	☐
Doença 5	☐
Doença 6	☐
Doença 7	☐
Doença 8	☐
Doença 9	☐
Doença 10	☐
Doença 11	☐
Doença 12	☐
Doença 13	☐
Doença 14	☐
Doença 15	☐
28. E TOMOU MEDICAMENTOS OU FEZ TRATAMENTO NOS ÚLTIMOS 12 MESES PARA ESTA(S) DOENÇA(S) ? Sim ..... 1 Não ..... 2 Não sabe 9	
Doença 1	☐
Doença 2	☐
Doença 3	☐
Doença 4	☐
Doença 5	☐
Doença 6	☐
Doença 7	☐
Doença 8	☐
Doença 9	☐
Doença 10	☐
Doença 11	☐
Doença 12	☐
Doença 13	☐
Doença 14	☐
Doença 15	☐

6 - CUIDADOS DE SAÚDE	6 - CUIDADOS DE SAÚDE
GOSTAVA AGORA DE FAZER ALGUMAS PERGUNTAS SOBRE AS CONSULTAS MAIS RECENTES. TANTO FAZ QUE TENHAM SIDO NO CENTRO DE SAÚDE, NO CONSULTÓRIO, EM CASA OU NOUTRO SÍTIO.	
1. NOS ÚLTIMOS TRÊS MESES, QUANTAS VEZES É QUE [O (A) SR(A) _____] CONSULTOU O MÉDICO ? Nenhuma ..... 00 → A. Seg. Não sabe 99	⌊_⌊_⌋
VAI AGORA LEMBRAR-SE APENAS DA ÚLTIMA VEZ QUE [O (A) SR(A) _____] FOI VISTO(A) PELO MÉDICO	
2. A QUE MÉDICO FOI ? ONDE FOI A CONSULTA ? (Indique) Não sabe ..... 99 Atenção: Se a consulta foi em hospital, indique o seu nome →	_____ _____ _____ ⌊_⌊_⌋ Código CUID _____ _____ Cód. INSA ⌊_⌋
3. FOI UMA CONSULTA DE CLÍNICA GERAL OU DE OUTRA ESPECIALIDADE ? (Indique) Não sabe 99	_____ _____ _____ ⌊_⌊_⌋ Código ESP

6 - CUIDADOS DE SAÚDE	6 - CUIDADOS DE SAÚDE
4. QUAL A <u>RAZÃO PRINCIPAL</u> PORQUE [O (A) SR(A) _____] FOI A ESSA CONSULTA ? PARA TER BAIXA ..... 1 → P.6 PORQUE SE SENTIU DOENTE ..... 2 → P.6 PARA PEDIR RECEITAS OU EXAMES ..... 3 → P.6 POR OUTRA RAZÃO ..... 4 Não sabe ..... 9 → P.7	⌊__⌋
5. DIGA-ME ENTÃO QUAL FOI ESSA OUTRA RAZÃO? Exame de rotina (sem ser doença) ..... 01 → P. 7 Medicina do trabalho ..... 02 Consulta de vigilância da gravidez e puerpério ..... 03 Realização de exames complementares de diagnóstico.... 04 Realização de tratamentos ..... 05 Medição da tensão arterial ..... 06 Obtenção de certificados ..... 07 Mostrar resultados de exames ..... 08 Exame de rotina (motivado por uma doença) ..... 09 Acidente ..... 10 Outros motivos (indique) 11	⌊__⌋⌊__⌋ _____
6. O QUE TEVE (QUE DOENÇA FOI) ? (Indique) Notas: 1 – Se o entrevistado não referir doença e ou sintomas, registe «Não teve nada» 2 - Se houver mais do que uma doença, registe a que originou mais dias de incapacidade. 3 - Se houve mais do que 1 lesão, descreva-as. 4 - Se o entrevistado não sabe o nome da doença ou da lesão, registe os primeiros 4 sintomas relatados e coloque um asterisco (*) logo a seguir ao sintoma que o entrevistado referir que mais o incomodou Se não houve doença ..... 000 0 0 Não sabe 000 0 9	_____ _____ _____ ⌊__⌋⌊__⌋⌊__⌋ ⌊__⌋ ⌊__⌋ Código PAT Cód. INSA ⌊__⌋

6 - CUIDADOS DE SAÚDE	6 - CUIDADOS DE SAÚDE
EM RELAÇÃO A ESTA ÚLTIMA CONSULTA GOSTARIA AINDA DE SABER:	
7. QUANTOS DIAS ESPEROU DESDE QUE FOI MARCADA A CONSULTA ATÉ QUE [O (A) SR(A) _____] FOI VISTO(A) ? Nenhum dia ..... 000 → P.9 Não sabe ……..... 999 → P.9	⌊_⌊_⌊_⌊_⌋ dias
8. QUAL A RAZÃO DESTA ESPERA ? Não precisava de ter consulta antes da data marcada ..... 1 Não havia vaga ..... 2 Não havia médico ..... 3 Outra situação (indique) ..... 4 Não sabe 9	⌊_⌋ _____
9. QUANTO TEMPO ESPEROU DESDE A HORA MARCADA ATÉ QUE [O (A) SR(A) _____] FOI ATENDIDO(A) ? Não esperou tempo nenhum ..... 000 Não sabe 999	⌊_⌊_⌊_⌊_⌋ minutos
Atenção: Faça a pergunta seguinte apenas aos indivíduos de 15 e mais anos , sendo o próprio a responder	
QUERO VOLTAR A LEMBRAR-LHE QUE AS SUAS RESPOSTAS SÃO CONFIDENCIAIS. GOSTAVA AGORA DE OUVIR A SUA OPINIÃO , TENDO EM ATENÇÃO OS VALORES MUITO BOM, BOM, RAZOÁVEL, MAU OU MUITO MAU.	
DIGA-ME, ENTÃO, EM RELAÇÃO À ÚLTIMA CONSULTA :	
10. COMO CONSIDERA O SERVIÇO PRESTADO PELO MÉDICO ? Muito bom ..... 1 Bom ..... 2 Razoável ..... 3 Mau ..... 4 Muito mau ..... 5 Não sabe 9	⌊_⌋

7 – CONSUMO DE BEBIDAS ALCOÓLICAS	7 – CONSUMO DE BEBIDAS ALCOÓLICAS
ÁREA DE INFORMAÇÃO ELIMINADA APÓS A ANÁLISE DE RESULTADOS DO PRÉ -TESTE	

8 – CONSUMO DE MEDICAMENTOS	8 – CONSUMO DE MEDICAMENTOS
AS DUAS PERGUNTAS SEGUINTES SÃO ACERCA DE MEDICAMENTOS QUE TENHA TOMADO NAS ÚLTIMAS DUAS SEMANAS E QUE TENHAM SIDO RECEITADOS POR UM MÉDICO E COMPRADOS NUMA FARMÁCIA.	
1. DIGA-ME, ENTÃO, SE [O (A) SR(A) _____] TOMOU MEDICAMENTOS RECEITADOS [INCLUINDO PÍLULAS CONTRACEPTIVAS OU OUTRAS HORMONAS, POMADAS, CREMES, INJECÇÕES, VACINAS] , NESTAS DUAS SEMANAS ? Sim ..... 1 Não ..... 2 → P.3 Não sabe ..... 9 → P.3	☐
2. E FORAM MEDICAMENTOS PARA QUÊ ? Sim ..... 1 Não ..... 2 Não sabe 9	
TENSÃO ARTERIAL ELEVADA	☐
OUTRA DOENÇA CARDIOVASCULAR	☐
BAIXAR O NÍVEL DE COLESTEROL	☐
DIABETES	☐
DOR DAS ARTICULAÇÕES (ARTROSES, ARTRITES)	☐
DOR DE CABEÇA OU ENXAQUECA	☐
OUTRA DOR	☐
ANSIEDADE OU NERVOSISMO	☐
ASMA	☐
BRONQUITE CRÓNICA OU ENFISEMA	☐
SINTOMAS ALÉRGICOS (ECZEMA, RINITE)	☐
DEPRESSÃO	☐
PROBLEMAS DO ESTÔMAGO	☐
(Continua)	

8 – CONSUMO DE MEDICAMENTOS	8 – CONSUMO DE MEDICAMENTOS
(Continuação)	
OU FORAM	
COMPRIMIDOS PARA DORMIR	☐
ANTIBIÓTICOS (INCLUA A PENICILINA)	☐
(Apenas para mulheres em idade fértil – até 50 anos) PÍLULAS CONTRACEPTIVAS	☐
(Apenas para mulheres em idade de menopausa ou depois – 45 anos e mais) HORMONAS PARA MENOPAUSA OU OSTEOPOROSE	☐
OUTROS MEDICAMENTOS RECEITADOS PELO MÉDICO	☐
Se Sim: PARA QUÊ ?	_____
3. DIGA-ME AGORA SE [O (A) SR(A) _____] DURANTE ESTAS DUAS SEMANAS TOMOU MEDICAMENTOS [INCLUINDO VITAMINAS E MINERAIS] NÃO RECEITADOS POR UM MÉDICO ? Sim ..... 1 Não ..... 2 → A. Seg. Não sabe ..... 9 → A. Seg.	☐
4. E FORAM MEDICAMENTOS PARA QUÊ ? Sim ..... 1 Não ..... 2 Não sabe 9	
DORES	☐
CONSTIPAÇÃO, GRIPE OU INFLAMAÇÃO DA GARGANTA	☐
SINTOMAS ALÉRGICOS (ECZEMA, RINITE)	☐
PROBLEMAS DO ESTÔMAGO	☐
OU FORAM	
VITAMINAS, MINERAIS OU TÓNICOS (FORTIFICANTES)	☐
OUTROS MEDICAMENTOS NÃO RECEITADOS POR MÉDICO	☐
Se Sim: PARA QUÊ ?	_____

9 - SAÚDE ORAL	9 - SAÚDE ORAL
Área a aplicar somente nas semanas 27 a 39	
(As perguntas seguintes são para pessoas com 2 e mais anos)	
AGORA, QUERO FAZER ALGUMAS PERGUNTAS SOBRE A SAÚDE DA BOCA.	
1. [O (A) SR(A) _____] JÁ CONSULTOU ALGUMA VEZ UM ESTOMATOLOGISTA, DENTISTA, HIGIENISTA OU OUTRO TÉCNICO DE SAÚDE DENTÁRIA ? Sim ..... 1 Não ..... 2 → P.4 Não sabe ……..... 9 → P.5	⌊__⌋
2. CONSULTOU - O(S) NOS ÚLTIMOS 12 MESES ? Sim ..... 1 Não ..... 2 → P. 4 Não sabe ..... 9 → P.5	⌊__⌋
3. QUAL A <u>RAZÃO PRINCIPAL</u> DA ÚLTIMA CONSULTA ? Porque estava com dores ou outra situação de urgência ..... 01 Para extrair um dente ..... 02 Para fazer uma prótese dentária ("placa") ..... 03 Porque queria conhecer o estado de saúde da boca ..... 04 Porque faz todos os anos uma visita ao dentista ..... 05 Para fazer uma higienização ("limpeza") da boca ..... 06 Para aplicar selantes de fissura ..... 07 Por outras razões (indique) ..... 08 Não sabe ..... 99 Passe → P.5	⌊__⌋⌊__⌋ _____
4. QUAL A RAZÃO PRINCIPAL PORQUE NÃO CONSULTOU ? Porque não precisou ..... 1 Porque não há dentista na localidade onde mora ..... 2 Porque é difícil marcar uma consulta ..... 3 Porque é muito caro ..... 4 Por outras razões (indique) ..... 5 Não sabe 9	⌊__⌋ _____

9 - SAÚDE ORAL	9 - SAÚDE ORAL
DIGA-NOS, AGORA	
5. [O (A) SR(A) _____] TEM PRÓTESE DENTÁRIA ("PLACA") ? Sim ..... 1 Não ..... 2 → P.8 Não sabe ..... 9 → P. 8	☐
6. QUE TIPO DE PRÓTESE DENTÁRIA ("PLACA") É ? "Placa" total ..... 1 "Placa" parcial ..... 2 Não sabe 9	☐
7. ESCOVA A PRÓTESE DENTÁRIA ("PLACA") QUANTAS VEZES POR DIA ? Não escova ..... 1 Escova menos de uma vez por dia (ocasionalmente) .. 2 Uma vez por dia ..... 3 Mais de uma vez por dia ..... 4 Não sabe ……..... 9 Atenção: Se registou 1 em P.6 ("placa" total) → P. 12	☐
8. [O (A) SR(A) _____] ESCOVA OS DENTES ? NUNCA ..... 1 → P. 12 ÀS VEZES ..... 2 UMA VEZ AO DIA ..... 3 DUAS VEZES AO DIA ..... 4 MAIS DE DUAS VEZES AO DIA ..... 5 Não sabe ……..... 9	☐
9. E [O (A) SR(A) _____] ESCOVA ANTES DE SE DEITAR ? Sim ..... 1 Não ..... 2. Não sabe 9	☐

9 - SAÚDE ORAL	9 - SAÚDE ORAL
10. ALÉM DA PASTA DENTÍFRICA E DA ESCOVA USA MAIS ALGUM PRODUTO PARA A SUA HIGIENE ORAL ? Sim ..... 1 Não ..... 2 → P.12 Não sabe ……..... 9 → P. 12	⌊_⌋
11. DIGA-ME, ENTÃO, O QUE É QUE [O (A) SR(A) _____] UTILIZA ? Sim ..... 1 Não ..... 2 Não sabe ..... 9 FIO DENTÁRIO ..... ESCOVILHÕES ..... LÍQUIDO PARA BOCHECHAR ..... OUTROS PRODUTOS (indique)	 ⌊_⌋ ⌊_⌋ ⌊_⌋ ⌊_⌋ _____
Atenção: Faça as perguntas P.12 e P.13 apenas aos indivíduos de <u>15 e mais anos</u> , sendo o <u>próprio</u> a responder	
GOSTAVA AGORA DE OUVIR A SUA <u>OPINIÃO</u> E <u>O QUE FAZ</u> RELATIVAMENTE A PROBLEMAS DOS DENTES QUE AS PESSOAS COSTUMAM TER. DIGA-ME:	
12. COMO SE PODEM PREVENIR AS DOENÇAS DA BOCA E E DOS DENTES ? Escovando os dentes ..... 1 Evitando comer alimentos açucarados ..... 2 Não se podem evita ..... 3 Outra razão (indique) ..... 4 Não sabe ..... 9 Atenção: Se registou 1 em P.6 (“placa” total) → A. Seg.	 ⌊_⌋ _____
13. EVITA COMER ALIMENTOS AÇUCARADOS PARA PREVENIR PROBLEMAS COM OS SEUS DENTES, PRINCIPALMENTE A CÁRIE DENTÁRIA ? SEMPRE ..... 1 MUITAS VEZES ..... 2 ALGUMAS VEZES ..... 3 POUCAS VEZES ..... 4 NUNCA ..... 5 Não sabe 9	 ⌊_⌋

10 - DESPESAS E RENDIMENTOS	10 – DESPESAS E RENDIMENTOS

QUERIA AGORA FAZER ALGUMAS PERGUNTAS SOBRE OS GASTOS QUE ESTA FAMÍLIA FEZ COM A SAÚDE NAS ÚLTIMAS DUAS SEMANAS:

Instruções: Considere as verbas realmente despendidas nestas 2 semanas, mesmo que os actos a que elas correspondem tenham sido anteriores às 2 semanas em causa.
Quando não seja possível individualizar uma despesa feita por vários membros da família, divida o total pelo número de pessoas a que se refere e atribua o valor encontrado a cada uma dessas pessoas. Se não há a certeza de certas verbas inscreva a aproximada.

DIGA-ME: QUANTO É QUE [O (A) SR(A) _____] GASTOU:

Se não houve despesa 0000

Não sabe 9999

	euros
1. COM CONSULTAS DE URGÊNCIA OU COM OUTRAS CONSULTAS ? ….	|_|_|_|_|
2. NESTAS 2 SEMANAS QUANTO GASTOU EM ANÁLISES E OUTROS EXAMES COMPLEMENTARES DE DIAGNÓSTICO, TAIS COMO: RADIOGRAFIAS, ECOGRAFIAS, MAMOGRAFIAS OU ELECTROCARDIOGRAMAS, POR EXEMPLO ? ……..	|_|_|_|_|
3. DIGA-ME, QUANTO GASTOU COM MEDICAMENTOS ……	|_|_|_|_|
4. E COM OUTROS TRATAMENTOS, COMO POR EXEMPLO, CIRURGIAS, TRATAMENTOS DE FISIOTERAPIA, TRATAMENTOS DENTÁRIOS, ETC...	|_|_|_|_|
5. E QUANTO GASTOU COM OUTROS TRATAMENTOS, EXAMES ESPECIAIS OU OUTRAS DESPESAS QUE EU NÃO TENHA PERGUNTADO? (INCLUA DESPESAS DE TRANSPORTE) ……...	|_|_|_|_|
(indique)	_____
	_____
	_____

10 - DESPESAS E RENDIMENTOS	10 – DESPESAS E RENDIMENTOS
6. NESTAS 2 SEMANAS, QUANTO É QUE [O (A) SR(A) _____] RECEBEU EM <u>SUBSÍDIOS OU COMPARTICIPAÇÕES</u> POR CONSULTAS, INTERNAMENTOS, OPERAÇÕES, TRATAMENTOS OU OUTRAS DESPESAS QUE TENHA FEITO ? Se não houve subsídios / comparticipações .....0000 Não sabe …… 9999	☐☐☐☐☐ euros
7. VOU AGORA MOSTRAR UM CARTÃO (Cartão nº1) E PEÇO O FAVOR DE ME INDICAR QUAL A LETRA QUE MAIS SE APROXIMA DO RENDIMENTO (GANHO) TOTAL DESTA FAMÍLIA <u>NO MÊS PASSADO</u>. INCLUA NESSE RENDIMENTO OS ORDENADOS, SALÁRIOS, HONORÁRIOS, RENDAS E PENSÕES, ABONOS, SUBSÍDIOS, ETC., DE TODAS AS PESSOAS. 1 - Considere o Rendimento Líquido Total 2 - Registe <u>em cada um</u> dos elementos da família a <u>soma</u> dos rendimentos individuais.) A ..... 01 B ..... 02 C ..... 03 D ..... 04 E ..... 05 F ..... 06 G ..... 07 H ..... 08 I ..... 09 J ..... 10 Não sabe ..... 99 Não quer responder 96	☐☐

11 - CONSUMO DE TABACO	11 - CONSUMO DE TABACO
Para as pessoas com <u>10 e mais anos</u>	
1. [O (A) SR(A) _____] FUMA ? DIARIAMENTE ..... 1 OCASIONALMENTE ..... 2 OU NÃO FUMA ..... 3 → P. 7 Não sabe ..... 9 → P. 7	⌊__⌋
2. E, EM RELAÇÃO ÀS ÚLTIMAS 2 SEMANAS, [O (A) SR(A) _____] FUMOU ? DIARIAMENTE ..... 1 OCASIONALMENTE ..... 2 OU NÃO FUMOU ..... 3 Não sabe ..... 9 Se P.1 = 2 e P.2 = 2 → P.6 Se P.1 = 2 e P.2 = 3 → P.6	⌊__⌋
3. O QUE É QUE FUMA HABITUALMENTE ? CIGARROS, CACHIMBO ... ? Só cigarros ..... 1 Cigarros e cachimbo ..... 2 Só cachimbo ..... 3 → P. 5 Só charutos ..... 4 → P. 5 Não sabe ……..…….…….... 9 → A. Seg.	⌊__⌋
4. QUANTOS CIGARROS FUMA, EM MÉDIA, POR DIA ? Não sabe 999	⌊__⌋⌊__⌋⌊__⌋ cigarros
5. DESDE QUE IDADE [O (A) SR(A) _____] FUMA ? (Se "não sabe" peça a idade aproximada)	⌊__⌋⌊__⌋ anos

11 - CONSUMO DE TABACO	11 - CONSUMO DE TABACO
6. E HÁ <u>DOIS ANOS ATRÁS</u> FUMAVA MENOS, O MESMO OU MAIS ? Fumava menos ..... 1 Fumava o mesmo ..... 2 Fumava mais ..... 3 Não fumava ..... 4 Não sabe ..... 9 (Se respondeu a esta pergunta → P.11)	⌊_⌋
7. JÁ ALGUMA VEZ [O (A) SR(A) _____] FUMOU ? DIARIAMENTE ..... 1 OCASIONALMENTE ..... 2 → P. 9 OU NUNCA FUMOU ..... 3 → P.14 Não sabe ..... 9 → P.14	⌊_⌋
8. QUANTOS CIGARROS FUMAVA, EM MÉDIA, POR DIA ? Não fumava cigarros ..... 000 Não sabe 999	⌊_⌋⌊_⌋⌊_⌋ cigarros
9. COM QUE IDADE COMEÇOU A FUMAR ? (Se "Não sabe" peça a idade aproximada)	⌊_⌋⌊_⌋ anos
10. COM QUE IDADE [O (A) SR(A) _____] DEIXOU DE FUMAR ? (Se "Não sabe" peça a idade aproximada) (Se respondeu a esta pergunta → P.13, quando se trata de pessoa com 15 e mais anos e sendo o próprio a responder; caso contrário → P.14)	⌊_⌋⌊_⌋ anos

11 - CONSUMO DE TABACO	11 - CONSUMO DE TABACO
11. [O (A) SR(A) _____] JÁ ALGUMA VEZ TENTOU DEIXAR DE FUMAR ? Sim ..... 1 Não ..... 2 → P. 14 Não sabe ……..... 9 → P. 14	⌊__⌋
12. QUANTAS VEZES TENTOU DEIXAR DE FUMAR ATÉ AGORA ? Uma vez ..... 1 Duas a três vezes ..... 2 Mais de três vezes ..... 3 Não sabe 9	⌊__⌋
Atenção: Faça a pergunta P.13 apenas aos indivíduos de <u>15 e mais anos</u> , sendo o <u>próprio</u> a responder	
13. POR QUE RAZÃO DEIXOU DE FUMAR [POR QUE RAZÃO TENTOU DEIXAR DE FUMAR DA ÚLTIMA VEZ] ? LEIA CADA UMA DAS RAZÕES E <u>ESCOLHA SÓ UMA</u> – A MAIS DECISIVA PARA SI. (Mostrar cartão nº 2) NÃO GOSTAR DO MAU CHEIRO DO FUMO ..... 01 MEDO DE PROBLEMAS DE SAÚDE ..... 02 FALTA DE DINHEIRO ..... 03 DEIXEI DE GOSTAR ..... 04 CONSELHO DO MÉDICO ..... 05 NÃO GOSTAVA DA MINHA DEPENDÊNCIA DO TABACO ..... 06 POR CONHECER PESSOAS DOENTES DEVIDO AO TABACO ..... 07 DESEJAR TER BOA CONDIÇÃO FÍSICA ..... 08 PORQUE ALGUNS DOS MEUS AMIGOS DEIXARAM DE FUMAR ..... 09 PORQUE A MINHA FAMÍLIA ME FORÇOU ..... 10 POR OUTRA RAZÃO (INDIQUE) ..... 11 Não sabe 99	⌊__⌋ _____

11 - CONSUMO DE TABACO	11 - CONSUMO DE TABACO
14. AO LONGO DA SEMANA, [O (A) SR(A) _____] QUANTO TEMPO ESTÁ EM ESPAÇOS FECHADOS JUNTO DE FUMADORES ? SEMPRE ..... 1 A MAIOR PARTE DO TEMPO ..... 2 BASTANTE TEMPO ..... 3 ALGUM TEMPO ..... 4 POUCO TEMPO ..... 5 OU NUNCA ..... 6 Não sabe 9	☐
(Faça esta pergunta apenas quando P.1 = 1 ou 2) 15. [O (A) SR(A) _____] EVITA FUMAR NA PRESENÇA DE PESSOAS QUE NÃO FUMEM? SEMPRE ..... 1 MUITAS VEZES ..... 2 ALGUMAS VEZES ..... 3 POUCAS VEZES ..... 4 OU NUNCA ..... 5 Não sabe 9	☐
(Faça esta pergunta apenas quando P.1 = 3) 16. [O (A) SR(A) _____] CHAMA A ATENÇÃO OU PEDE AOS FUMADORES QUE EVITEM FUMAR NA SUA PRESENÇA ? SEMPRE ..... 1 MUITAS VEZES ..... 2 ALGUMAS VEZES ..... 3 POUCAS VEZES ..... 4 OU NUNCA ..... 5 Não sabe …….. 9	☐

12 - CONSUMO DE ALIMENTOS E BEBIDAS	12 - CONSUMO DE ALIMENTOS E BEBIDAS
VOU AGORA FAZER ALGUMAS PERGUNTAS SOBRE O QUE AS PESSOAS COSTUMAM COMER E BEBER. ANTES GOSTARIA DE INFORMAR QUE POR REFEIÇÕES PRINCIPAIS ENTENDE-SE O PEQUENO ALMOÇO, O ALMOÇO E O JANTAR.	
1. QUANTAS REFEIÇÕES PRINCIPAIS É QUE [O (A) SR(A) _____] TOMA HABITUALMENTE POR DIA ? Não sabe ……..... 9	☐
2. <u>ONTEM</u>, O QUE COMEU NAS 3 REFEIÇÕES PRINCIPAIS ? Sim ..... 1 Não ..... 2 Não sabe 9	
LEITE/IOGURTE/QUEIJO	☐
SOPA.....	☐
PÃO.....	☐
CARNE.....	☐
PEIXE.....	☐
BATATAS/ARROZ/MASSA.....	☐
FEIJÃO/GRÃO.....	☐
SALADA/LEGUMES COZIDOS.....	☐
FRUTA.....	☐
BOLOS/CHOCOLATES/SOBREMESA DOCE.....	☐
OUTROS ALIMENTOS.....	☐
(Se 2 em todas as alternativas, registe 1 em « Não comeu nada »; caso contrário, registe 2)	
Não comeu nada.....	☐

12 - CONSUMO DE ALIMENTOS E BEBIDAS	12 - CONSUMO DE ALIMENTOS E BEBIDAS
3. [O (A) SR(A) _____] COME HABITUALMENTE FORA DAS 3 REFEIÇÕES PRINCIPAIS ? Se sim: QUANTAS VEZES ? Não come fora das refeições ..... 00 Não sabe …….... 99	☐☐
4. ONTEM, O QUE COMEU E BEBEU FORA DAS 3 REFEIÇÕES PRINCIPAIS ? Sim ..... 1 Não ..... 2 Não sabe 9	
FRUTA	☐
PÃO/SANDE	☐
LEITE/IOGURTE/QUEIJO	☐
SUMO/NÉCTAR	☐
REFRIGERANTE	☐
BEBIDA ALCOÓLICA	☐
BOLOS/CHOCOLATES/SOBREMESA DOCE	☐
OUTRAS GULOSEIMAS	☐
SALGADOS/RISSÓIS/CROQUETES/FOLHADOS/EMPADAS ….	☐
BATATAS FRITAS	☐
OUTROS ALIMENTOS	☐
(Se 2 em todas as alternativas, registe 1 em « Não comeu nada »; caso contrário, registe 2) Não comeu nada.....	☐

12 - CONSUMO DE ALIMENTOS E BEBIDAS	12 - CONSUMO DE ALIMENTOS E BEBIDAS
5. QUAL É A GORDURA MAIS FREQUENTEMENTE USADA NA CONFECÇÃO DAS [SUAS] REFEIÇÕES [DO (A) SR(A) ____] ? <u>ESCOLHA SÓ UMA</u>. ÓLEO VEGETAL ..... 01 AZEITE ..... 02 MARGARINA ..... 03 MANTEIGA ..... 04 BANHA ..... 05 Não se usa gordura ..... 06 Não se cozinha em casa ..... 07 Não sabe 99	☐☐
AGORA, QUERO AINDA FAZER ALGUMAS PERGUNTAS SOBRE O QUE AS PESSOAS COSTUMAM BEBER. DIGA-ME, ENTÃO.	
6. [O(A) SR(A) _____] TOMOU, <u>DURANTE OS ÚLTIMOS 12 MESES</u>, ALGUMA DAS BEBIDAS QUE VOU DIZER ? Sim ..... 1 Não ..... 2 Não sabe ..... 9 VINHO ..... CERVEJA ..... BAGAÇO/AGUARDENTE/BRANDY ……..... VINHO DO PORTO/MARTINI/LICORES ……..... WHISKY/GIN/VODKA ……..... (Se 2 em alguma posição não faça a pergunta correspondente a essa bebida, relativa ao período da última semana) (Se 2 em todas as posições → A. Seg.)	☐ ☐ ☐ ☐ ☐

12 - CONSUMO DE ALIMENTOS E BEBIDAS	12 - CONSUMO DE ALIMENTOS E BEBIDAS
AGORA, PEÇO PARA SE LEMBRAR APENAS DO QUE ACONTECEU NA ÚLTIMA SEMANA (7 DIAS). DIGA-ME ENTÃO.	
7. QUANTOS DIAS BEBEU <u>VINHO</u> ? Não bebeu ..... 00 → P. 9 Não sabe ..... 99 → P. 9	⌊_⌊_⌋
8. QUANTOS DESTES COPOS (OU GARRAFAS) É QUE BEBEU, EM MÉDIA, POR DIA ? (Mostrar cartão nº 3) Não sabe 9.99; 9.999	⌊_⌊_⌋ . ⌊_⌊_⌋ copos/garrafas ⌊_⌊_⌋ . ⌊_⌊_⌊_⌋ capacidade
9. E EM QUANTOS DIAS É QUE BEBEU <u>CERVEJA</u>? Não bebeu ..... 00 → P. 11 Não sabe ..... 99 → P. 11	⌊_⌊_⌋
10. QUANTOS COPOS (OU GARRAFAS) BEBEU, EM MÉDIA, POR DIA ? (Mostrar cartão nº 4) Não sabe 9.99; 9.999	⌊_⌊_⌋ . ⌊_⌊_⌋ copos/garrafas ⌊_⌊_⌋ . ⌊_⌊_⌊_⌋ capacidade
11. AINDA RELATIVAMENTE À ÚLTIMA SEMANA (7 DIAS), EM QUANTOS DIAS É QUE [O (A) SR(A) _____] <u>BEBEU BAGAÇO/AGUARDENTE/ BRANDY</u> ? Não bebeu ..... 00 → P. 13 Não sabe …….. 99 → P. 13	⌊_⌊_⌋
12. QUANTOS DESTES COPOS BEBEU, EM MÉDIA, POR DIA ? (Mostrar cartão nº 5) Não sabe 9.99; 9.999	⌊_⌊_⌋ . ⌊_⌊_⌋ copos ⌊_⌊_⌋ . ⌊_⌊_⌊_⌋ capacidade

12 - CONSUMO DE ALIMENTOS E BEBIDAS	12 - CONSUMO DE ALIMENTOS E BEBIDAS
13. E <u>VINHO DO PORTO/MARTINI/LICORES</u>, EM QUANTOS DIAS É QUE BEBEU ? Não bebeu ..... 00 → P. 15 Não sabe ..... 99 → P. 15	⌊_⌊_⌋
14. QUANTOS COPOS BEBEU, EM MÉDIA, POR DIA ? (Mostrar cartão nº 6) Não sabe ……..... 9.99; 9.999	⌊_⌋.⌊_⌊_⌋ copos ⌊_⌋.⌊_⌊_⌊_⌋ capacidade
15. POR ÚLTIMO, DIGA-ME, NA ÚLTIMA SEMANA (7 DIAS), QUANTOS DIAS É QUE [O (A) SR(A) _____] BEBEU <u>WHISKY/GIN/VODKA</u> ? Não bebeu ..... 00 → P.17 Não sabe ..... 99 → P.17	⌊_⌊_⌋
16. QUANTOS DESTES COPOS BEBEU, EM MÉDIA, POR DIA ? (Mostrar cartão nº 7) Não sabe 9.99; 9.999	⌊_⌋.⌊_⌊_⌋ copos ⌊_⌋.⌊_⌊_⌊_⌋ capacidade
Se registou 00 em P.7, P.9, P.11, P.13 e P.15 → A. Seg.	
PARA ACABAR ESTAS PERGUNTAS, GOSTARIA AINDA DE SABER.	

12 - CONSUMO DE ALIMENTOS E BEBIDAS	12 - CONSUMO DE ALIMENTOS E BEBIDAS
17. NA ÚLTIMA SEMANA (7 DIAS) [O (A) SR(A) _____] EM QUANTOS DIAS TOMOU ESSA(S) BEBIDA(S) ... ? Nenhum …….00 Não sabe 99	Dias
SOZINHO	☐☐
NUM BAR, TABERNA OU CAFÉ	☐☐
NUM ACONTECIMENTO DESPORTIVO OU OUTRA DIVERSÃO …….....	☐☐
AO ALMOÇO	☐☐
AO JANTAR	☐☐
ANTES DE CONDUZIR UM AUTOMÓVEL OU MOTORIZADA	☐☐
18. DIGA-ME, ENTÃO. ACHA QUE BEBEU MENOS, O MESMO OU MAIS AO FIM-DE-SEMANA, EM COMPARAÇÃO COM OS DIAS DA SEMANA? Bebeu menos ..... 1 Bebeu o mesmo ..... 2 Bebeu mais ..... 3 Não bebeu ao fim-de-semana ..... 4 Não sabe ……..... 9	☐
Atenção: Se registou dias em P.7 ou P.9 ou P.11 ou P.13 ou P.15, faça as perguntas seguintes apenas aos indivíduos de 15 e mais anos , sendo o próprio a responder	
LEMBRANDO-O(A) QUE AS SUAS RESPOSTAS SÃO CONFIDENCIAIS, DIGA-ME POR FIM.	
19. ALGUMA VEZ SENTIU QUE DEVERIA REDUZIR O SEU CONSUMO DE ÁLCOOL ? Sim ..... 1 Não 2	☐

12 - CONSUMO DE ALIMENTOS E BEBIDAS	12 - CONSUMO DE ALIMENTOS E BEBIDAS
20. ALGUMA VEZ SE SENTIU ABORRECIDO POR OUTRAS PESSOAS CRITICAREM O SEU CONSUMO DE ÁLCOOL ? Sim ..... 1 Não 2	⌊_⌋
21. ALGUMA VEZ SE SENTIU MAL OU CULPADO EM RELAÇÃO AO SEU CONSUMO DE ÁLCOOL ? Sim ..... 1 Não 2	⌊_⌋
22. ALGUMA VEZ CONSUMIU BEBIDAS ALCOÓLICAS LOGO DE MANHÃ PARA ACALMAR OS SEUS NERVOS, PARA SE LIVRAR DE UMA RESSACA OU PARA COMEÇAR O DIA ? Sim ..... 1 Não 2	⌊_⌋

13 – SAÚDE REPRODUTIVA E PLANEAMENTO FAMILIAR	13 - SAÚDE REPRODUTIVA
Pergunte a todas as mulheres com idade entre os 15 e os 55 anos, sendo a própria a responder.	
GOSTAVA AGORA QUE ME RESPONDESSE A UMAS PERGUNTAS QUE COSTUMAMOS FAZER A MULHERES COM IDADE DE PODEREM TER FILHOS.	
1. JÁ ESTEVE GRÁVIDA ? Sim ..... 1 Não ..... 2 → P. 7 Actualmente está grávida 3	☐
2. DIGA A DATA DE NASCIMENTO DO SEU FILHO (A) MAIS NOVO. Se não tem filhos ..... 7 → P. 7 Se não sabe: registe a data aproximada Portanto, a idade é ..... Se a criança tem mais de 5 anos → P. 7	☐☐☐☐☐☐ dia mês ano ☐ ☐☐ anos
3. FOI A ALGUMA CONSULTA ANTES DE ENGRAVIDAR PARA PREPARAR A GRAVIDEZ DESTE FILHO MAIS NOVO ? Sim ..... 1 Não 2	☐
4. QUANTO TEMPO AMAMENTOU EM EXCLUSIVO O SEU BEBÉ ? Até 7 dias ..... 1 Até 1 mês..... 2 Até 2 meses..... 3 Até 3 meses..... 4 Até 6 ou mais meses..... 5 Não amamentou..... 6	☐
5. O BEBÉ TOMOU BIBERÃO ? Sim ..... 1 Não ..... 2 → P. 7	☐
6. COM QUANTOS MESES É QUE O BEBÉ COMEÇOU A TOMAR BIBERÃO ? Menos de 1 mês 00	☐☐ meses

13 – SAÚDE REPRODUTIVA E PLANEAMENTO FAMILIAR	13 - SAÚDE REPRODUTIVA
7. DIGA-ME AGORA. A SENHORA OU O SEU MARIDO/COMPANHEIRO ESTÃO A FAZER ALGUMA COISA PARA A SENHORA NÃO ENGRAVIDAR ? Sim ..... 1 Não ..... 2 → P. 10	☐
8. QUAL OU QUAIS MÉTODOS É QUE A SENHORA OU O SEU MARIDO/COMPANHEIRO ESTÃO A <u>UTILIZAR ACTUALMENTE</u> PARA EVITAR A GRAVIDEZ ? Atenção: Mostrar o cartão nº 8 apenas para confirmar a resposta. Sim ..... 1 Não 2	
A ….....Pílula	☐
B .....…. DIU (Dispositivo intra-uterino) / 'Aparelho'	☐
C ...….....Preservativo (' Camisa ')	☐
D ...….....…. Diafragma	☐
E ..... Espermicida (creme, espumas, comprimidos vaginais, etc.)	☐
F ....….....…. Hormona injectável trimestral ('Injecção')	☐
G .....……. Implante	☐
H .....……. Laqueação de trompas	☐
I ....….....…. Vasectomia	☐
J .....……. Abstinência periódica - Calendário (contas)	☐
L .....…. Abstinência periódica **-** Temperatura basal	☐
M .....……. Abstinência periódica **-** Muco	☐
N ....….....…. Abstinência periódica **-** Outro	☐
O ....….….....Coito interrompido	☐
P .....……. Outro (indique)	☐
	_____

13 – SAÚDE REPRODUTIVA E PLANEAMENTO FAMILIAR	13 - SAÚDE REPRODUTIVA
9. EM QUE LOCAL FAZ A VIGILÂNCIA DA UTILIZAÇÃO DO MÉTODO CONTRACEPTIVO ? Centro de Saúde ..... 1 Maternidade / Hospital ..... 2 Consultório / Clínica Privada ..... 3 Outro (indique) ..... 4 Não faz ..... 5 Passe → P.11	⌊__⌋ _____
10. POR QUE RAZÃO ? Está a amamentar ..... 01 Está grávida ..... 02 Não está grávida e não quer engravidar .... 03 Quer engravidar ..... 04 Não tem actividade sexual actualmente .... 05 Razões de saúde ..... 06 Não sabia que podia evitar ..... 07 Não sabia onde se informar ..... 08 Tem medo que lhe faça mal ..... 09 O marido/companheiro não quer ..... 10 Infertilidade da própria ..... 11 Infertilidade do marido/companheiro ..... 12 Está na menopausa ..... 13 Outra (indique) 14	⌊__⌋ _____
11. JÁ ALGUMA VEZ UTILIZOU A CONTRACEPÇÃO DE EMERGÊNCIA (PÍLULA DO DIA SEGUINTE) ? Sim ..... 1 Não 2	⌊__⌋

14 – ACTIVIDADE FÌSICA	14 – ACTIVIDADE FÌSICA
<u>Área a aplicar somente nas semanas 14 a 26</u>	
Para pessoas com <u>15 e mais anos (com exclusão de pessoas com *handicap* – P.0 = 1)</u>	
0. [O(A) SR(A) _____] ESTÁ SEMPRE ACAMADO(A) OU SENTADO(A) NUMA CADEIRA TODO O DIA OU LIMITADO(A) À SUA CASA ? Sim …… 1 → A. Seg. Não …… 2 Não sabe …… 9 → A. Seg.	☐
TEM MUITO INTERESSE SABER QUE ACTIVIDADE FÍSICA AS PESSOAS FAZEM NO SEU DIA A DIA. ASSIM, VOU FAZER ALGUMAS PERGUNTAS SOBRE O TEMPO GASTO EM ACTIVIDADES FÍSICAS NOS ÚLTIMOS 7 DIAS. MESMO QUE NÃO [SE] CONSIDERE [O(A) SR(A) _____] UMA PESSOA ACTIVA, GOSTARIA QUE PENSASSE NAS ACTIVIDADES FEITAS NO TRABALHO, EM CASA, NO JARDIM OU NA HORTA, NA DESLOCAÇÃO DE UM LUGAR PARA OUTRO E AINDA NOS TEMPOS LIVRES EM EXERCÍCIO OU DESPORTO.	
PENSE EM TODAS AS ACTIVIDADES VIGOROSAS (ENÉRGICAS) QUE PRECISARAM DE UM ESFORÇO FÍSICO DURO (DIFÍCIL) E QUE [O(A) SR(A) _____] FEZ NOS ÚLTIMOS 7 DIAS, INCLUINDO A ACTIVIDADE PROFISSIONAL. ENTENDE-SE POR ACTIVIDADES VIGOROSAS AQUELAS QUE FAZEM RESPIRAR MAIS FORTEMENTE DO QUE O NORMAL E PODEM INCLUIR LEVANTAR CARGAS PESADAS, CAVAR A TERRA, FAZER GINÁSTICA AERÓBICA, CORRER, NADAR, JOGAR FUTEBOL OU ANDAR DE BICICLETA RAPIDAMENTE. GOSTARIA, ENTÃO, QUE PENSASSE APENAS NESSAS ACTIVIDADES FÍSICAS QUE FEZ PELO MENOS DURANTE 10 MINUTOS DE UMA VEZ. 1. NOS ÚLTIMOS 7 DIAS, EM QUANTOS DIAS FEZ ACTIVIDADES FÍSICAS VIGOROSAS ? Nenhum dia ..... 00 → P. 4 Não sabe ..... 99 → P. 4	☐☐
2. QUANTO TEMPO NO TOTAL GASTOU HABITUALMENTE <u>EM 1 DESSES DIAS</u>, FAZENDO ACTIVIDADES FÍSICAS VIGOROSAS ? Não sabe porque o seu padrão varia muito de dia para dia..... 99.99	☐☐ h ☐☐ m por dia

14 – ACTIVIDADE FÌSICA	14 – ACTIVIDADE FÌSICA
(Faça esta pergunta apenas quando P.2=99.99) 3. ENTÃO, QUAL FOI O TEMPO TOTAL QUE GASTOU DURANTE OS ÚLTIMOS 7 DIAS, FAZENDO ACTIVIDADES FÍSICAS VIGOROSAS ? Não sabe 99.99	___ h ___ m na semana
AGORA, PENSE NAS ACTIVIDADES QUE PRECISARAM DE UM ESFORÇO FÍSICO MODERADO QUE [O(A) SR(A) _____] FEZ NOS ÚLTIMOS 7 DIAS, INCLUINDO A ACTIVIDADE PROFISSIONAL. AS ACTIVIDADES FÍSICAS MODERADAS FAZEM RESPIRAR UM POUCO MAIS FORTEMENTE DO QUE O NORMAL E PODEM INCLUIR TRANSPORTAR CARGAS LEVES, ANDAR DE BICICLETA DEVAGAR, ESFREGAR A CASA, ASPIRAR, CUIDAR DO JARDIM, CAÇAR. NÃO INCLUI O ANDAR. MAIS UMA VEZ, PENSE APENAS NESSAS ACTIVIDADES FÍSICAS QUE FEZ PELO MENOS DURANTE 10 MINUTOS DE UMA VEZ. 4. NOS ÚLTIMOS 7 DIAS, EM QUANTOS DIAS FEZ ACTIVIDADES FÍSICAS MODERADAS ? Nenhum dia ..... 00 → P. 7 Não sabe ..... 99 → P. 7	__
5. QUANTO TEMPO NO TOTAL GASTOU HABITUALMENTE EM 1 DESSES DIAS, FAZENDO ACTIVIDADES FÍSICAS MODERADAS ? Não sabe porque o seu padrão varia muito de dia para dia 99.99	___ h ___ m por dia
(Faça esta pergunta apenas quando P.5 = 99.99) 6. ENTÃO, QUAL FOI O TEMPO TOTAL QUE GASTOU DURANTE OS ÚLTIMOS 7 DIAS, FAZENDO ACTIVIDADES FÍSICAS MODERADAS ? Não sabe 99.99	___ h ___ m por semana

14 – ACTIVIDADE FÌSICA	14 –ACTIVIDADE FÌSICA
PENSE NO TEMPO GASTO A ANDAR NOS ÚLTIMOS 7 DIAS. ISTO INCLUI ANDAR NO TRABALHO E EM CASA, DESLOCAR-SE DE UM LUGAR PARA OUTRO E AINDA O ACTO DE CAMINHAR SOMENTE POR RECREAÇÃO, DESPORTO, EXERCÍCIO OU LAZER. 7. NOS ÚLTIMOS 7 DIAS, EM QUANTOS DESSES DIAS ANDOU PELO MENOS 10 MINUTOS DE UMA VEZ ? Nenhum dia ..... 00 → P. 10 Não sabe ..... 99 → P. 10	☐☐
8. QUANTO TEMPO NO TOTAL GASTOU HABITUALMENTE EM 1 DESSES DIAS, A ANDAR ? Não sabe porque o seu padrão varia muito de dia para dia 99.99	☐☐ h ☐☐ m por dia
(Faça esta pergunta apenas quando P.8=99.99) 9. ENTÃO, QUAL FOI O TEMPO TOTAL QUE GASTOU DURANTE OS ÚLTIMOS 7 DIAS, A ANDAR ? Não sabe 99.99	☐☐ h ☐☐ m na semana
AGORA, PENSE NO TEMPO GASTO SENTADO NOS DIAS ÚTEIS DURANTE OS ÚLTIMOS 7 DIAS. INCLUA O TEMPO GASTO NO TRABALHO, EM CASA, ENQUANTO FAZ O TRABALHO CORRENTE E DURANTE O TEMPO DE LAZER. INCLUA AINDA O TEMPO GASTO COM COISAS TAIS COMO ESTAR SENTADO A UMA SECRETÁRIA, ESTAR EM VISITA EM CASA DE AMIGOS, LER OU ESTAR SENTADO OU EM REPOUSO VENDO TELEVISÃO OU OUVINDO MÚSICA. (INCLUI O TEMPO GASTO ESTANDO DEITADO, MAS ACORDADO). 10. NOS ÚLTIMOS 7 DIAS, QUANTO TEMPO NO TOTAL GASTOU HABITUALMENTE EM 1 DESSES DIAS ÚTEIS DA SEMANA, ESTANDO SENTADO ? Não sabe porque o seu padrão varia muito de dia para dia 99.99	☐☐ h ☐☐ m por dia
(Faça esta pergunta apenas quando P.10=99.99) 11. ENTÃO, QUAL FOI O TEMPO TOTAL QUE GASTOU, NA ÚLTIMA QUARTA-FEIRA, ESTANDO SENTADO ? Não sabe 99.99	☐☐ h ☐☐ m na quarta-feira

15 – SAÚDE MENTAL	15 – SAÚDE MENTAL
Atenção: Faça as perguntas desta área apenas aos indivíduos de 15 e mais anos , sendo o próprio a responder	
AS PERGUNTAS QUE SE SEGUEM PRETENDEM AVALIAR A FORMA COMO SE SENTIU E COMO LHE CORRERAM AS COISAS NAS ÚLTIMAS QUATRO SEMANAS. (Mostrar cartão nº 9)	
1. NAS ÚLTIMAS 4 SEMANAS, QUANTO TEMPO SE SENTIU MUITO NERVOSO(A) ? SEMPRE. ..... 1 A MAIOR PARTE DO TEMPO ..... 2 BASTANTE TEMPO ..... 3 ALGUM TEMPO ..... 4 POUCO TEMPO ..... 5 NUNCA 6	⌊_⌋
2. NAS ÚLTIMAS 4 SEMANAS, QUANTO TEMPO SE SENTIU TÃO DEPRIMIDO(A) QUE NADA O(A) ANIMAVA ? SEMPRE ..... 1 A MAIOR PARTE DO TEMPO ..... 2 BASTANTE TEMPO ..... 3 ALGUM TEMPO ..... 4 POUCO TEMPO ..... 5 NUNCA 6	⌊_⌋
3. NAS ÚLTIMAS 4 SEMANAS, QUANTO TEMPO SE SENTIU CALMO(A) E TRANQUILO(A) ? SEMPRE ..... 1 A MAIOR PARTE DO TEMPO ..... 2 BASTANTE TEMPO ..... 3 ALGUM TEMPO. ..... 4 POUCO TEMPO ..... 5 NUNCA 6	⌊_⌋
4. NAS ÚLTIMAS QUATRO SEMANAS, QUANTO TEMPO SE SENTIU TRISTE/DESANIMADO(A) E EM BAIXO/ABATIDO(A) ? SEMPRE ..... 1 A MAIOR PARTE DO TEMPO ..... 2 BASTANTE TEMPO ..... 3 ALGUM TEMPO ..... 4 POUCO TEMPO ..... 5 NUNCA 6	⌊_⌋
5. NAS ÚLTIMAS 4 SEMANAS, QUANTO TEMPO SE SENTIU FELIZ ? SEMPRE ..... 1 A MAIOR PARTE DO TEMPO ..... 2 BASTANTE TEMPO ..... 3 ALGUM TEMPO ..... 4 POUCO TEMPO ..... 5 NUNCA 6	⌊_⌋

16 – CUIDADOS PREVENTIVOS	16 – CUIDADOS PREVENTIVOS
Área a aplicar somente nas semanas 27 a 39	
Para as pessoas com <u>15 e mais anos</u>	
GOSTAVA AGORA DE FAZER UMAS PERGUNTAS MUITO BREVES SOBRE ALGUNS CUIDADOS QUE AS PESSOAS PODEM TER PARA PREVENIR AS DOENÇAS.	
1. QUANDO FOI A ÚLTIMA VEZ QUE [O(A) SR(A) _____] SE VACINOU CONTRA A GRIPE ? EM 2005 ..... 1 EM 2004 ..... 2 EM 2003 OU ANTES ..... 3 → P.3 Nunca se vacinou contra a gripe ...……..... 4 → P.3 Não sabe ……..... 9 → P.3	☐
2. EM QUE MÊS FOI ? Atenção: Registe o número do mês correspondente (01 a 12) Não sabe 99	☐☐
3. QUANDO FOI A ÚLTIMA VEZ QUE[O(A) SR(A) _____] VERIFICOU (MEDIU) A [SUA] TENSÃO ARTERIAL? Há menos de 3 meses ..... 1 Entre 3 a 5 meses ..... 2 Entre 6 e 11 meses ……..... 3 Entre um e três anos ..... 4 Há mais de três anos ..... 5 Nunca mediu a tensão arterial ..... 6 Não sabe 9	☐

16 – CUIDADOS PREVENTIVOS	16 – CUIDADOS PREVENTIVOS
4. QUANDO FOI A ÚLTIMA VEZ QUE [O(A) SR(A) _____] VERIFICOU (MEDIU) O [SEU] COLESTEROL? Há menos de 3 meses ..... 1 Entre 3 a 5 meses atrás ..... 2 Entre 6 e 11 meses atrás ..... 3 Entre um e três anos atrás ..... 4 Há mais de três anos ..... 5 Nunca mediu o colesterol ...……. 6 Não sabe 9	⌊__⌋
As próximas 2 perguntas são apenas para mulheres de 20 e mais anos, sendo a própria a responder.	
5. EM QUE ANO FEZ A ÚLTIMA MAMOGRAFIA, ISTO É, UMA RADIOGRAFIA AO PEITO ? Atenção: Registe os quatro algarismos (xxxx) Se não sabe, registe o ano aproximado Se nunca fez mamografia registe 0000	⌊__⌋⌊__⌋⌊__⌋⌊__⌋
6. EM QUE ANO FEZ A ÚLTIMA CITOLOGIA (ESFREGAÇO VAGINAL / TESTE DE PAPANICOLAU) ? Atenção: Registe os quatro algarismos (xxxx) Se não sabe, registe o ano aproximado Se nunca fez uma citologia registe 0000	⌊__⌋⌊__⌋⌊__⌋⌊__⌋

17 – QUALIDADE DE VIDA	17 – QUALIDADE DE VIDA
Área a aplicar somente nas semanas 40 a 52	
Atenção: Faça as perguntas desta área apenas aos indivíduos de 15 e mais anos , sendo o próprio a responder	
COM AS PERGUNTAS QUE SE SEGUEM PRETENDEMOS SABER COMO SE SENTE QUANTO À SUA QUALIDADE DE VIDA, SAÚDE OU OUTROS ASPECTOS DA SUA VIDA. PENSE NAQUILO QUE ACONTECEU NA SUA VIDA NAS ÚLTIMAS DUAS SEMANAS.	
1. COMO CLASSIFICA A SUA QUALIDADE DE VIDA ? MUITO MÁ ..... 1 MÁ ..... 2 NEM MÁ NEM BOA ..... 3 BOA ..... 4 MUITO BOA 5	⌊__⌋
2. ATÉ QUE PONTO ESTÁ SATISFEITO(A) COM A SUA SAÚDE ? MUITO INSATISFEITO(A) ..... 1 INSATISFEITO(A) ..... 2 NEM SATISFEITO(A) NEM INSATISFEITO(A) ..... 3 SATISFEITO(A) ..... 4 MUITO SATISFEITO(A) 5	⌊__⌋
3. TEM A ENERGIA SUFICIENTE PARA O SEU DIA-A-DIA ? NÃO TENHO NENHUMA ..... 1 TENHO MUITO POUCA ..... 2 TENHO ALGUMA ..... 3 TENHO GERALMENTE ..... 4 TENHO TODA A ENERGIA 5	⌊__⌋
4. ATÉ QUE PONTO ESTÁ SATISFEITO(A) COM A SUA CAPACIDADE PARA REALIZAR AS SUAS ACTIVIDADES DIÁRIAS ? MUITO INSATISFEITO(A) ..... 1 INSATISFEITO(A) ..... 2 NEM SATISFEITO(A) NEM INSATISFEITO(A) ..... 3 SATISFEITO(A) ..... 4 MUITO SATISFEITO(A) 5	⌊__⌋

17 – QUALIDADE DE VIDA	17 – QUALIDADE DE VIDA
5. ATÉ QUE PONTO ESTÁ SATISFEITO(A) CONSIGO PRÓPRIO(A) ? MUITO INSATISFEITO(A) ..... 1 INSATISFEITO(A) ..... 2 NEM SATISFEITO(A) NEM INSATISFEITO(A) ..... 3 SATISFEITO(A) ..... 4 MUITO SATISFEITO(A) 5	⌊_⌋
6. E COM AS SUAS RELAÇÕES PESSOAIS ? MUITO INSATISFEITO(A) ..... 1 INSATISFEITO(A) ..... 2 NEM SATISFEITO(A) NEM INSATISFEITO(A) ..... 3 SATISFEITO(A) ..... 4 MUITO SATISFEITO(A) 5	⌊_⌋
7. TEM O DINHEIRO SUFICIENTE PARA ENFRENTAR AS SUAS NECESSIDADES ? DE MODO NENHUM ..... 1 UM POUCO ..... 2 TENHO ALGUM ..... 3 GERALMENTE TENHO .... 4 TENHO COMPLETAMENTE 5	⌊_⌋
8. ATÉ QUE PONTO ESTÁ SATISFEITO(A) COM AS CONDIÇÕES DO LOCAL ONDE VIVE ? MUITO INSATISFEITO(A) ..... 1 INSATISFEITO(A) ..... 2 NEM SATISFEITO(A) NEM INSATISFEITO(A) ..... 3 SATISFEITO(A) ..... 4 MUITO SATISFEITO(A) 5	⌊_⌋

18 – INSEGURANÇA ALIMENTAR	18 - INSEGURANÇA ALIMENTAR
Área a aplicar somente nas semanas 40 a 52	
Atenção: Faça as perguntas desta área apenas ao(à) representante da família	
AS PRÓXIMAS PERGUNTAS SÃO SOBRE ASPECTOS, DIFERENTES DOS JÁ AQUI ABORDADOS, SOBRE A ALIMENTAÇÃO DA SUA FAMÍLIA E REFEREM-SE À CAPACIDADE PARA ADQUIRIR OS ALIMENTOS DE QUE NECESSITA. AS FRASES QUE VOU LER FORAM DITAS POR ALGUMAS PESSOAS PARA DESCREVER A ALIMENTAÇÃO DELAS. DIGA-ME, POR FAVOR, SE CONSIDERA CADA UMA DESTAS FRASES "QUASE SEMPRE VERDADEIRA", "ÀS VEZES VERDADEIRA" OU "NUNCA VERDADEIRA", NO QUE SE REFERE À SUA FAMÍLIA, NOS ÚLTIMOS 12 MESES.	
1. " OS ALIMENTOS QUE COMPREI JÁ ACABARAM E NÃO TENHO DINHEIRO PARA COMPRAR MAIS ". NA SUA OPINIÃO, ESTA AFIRMAÇÃO É ... QUASE SEMPRE VERDADEIRA ..... 1 ÀS VEZES VERDADEIRA ..... 2 NUNCA É VERDADEIRA ..... 3 Recusa ..... 8 Não sabe 9	☐
2. " EU NÃO CONSIGO COMPRAR ALIMENTOS PARA FAZER REFEIÇÕES COMPLETAS E SAUDÁVEIS". NA SUA OPINIÃO, ESTA AFIRMAÇÃO É ... QUASE SEMPRE VERDADEIRA ..... 1 ÀS VEZES VERDADEIRA ..... 2 NUNCA É VERDADEIRA ..... 3 Recusa ..... 8 Não sabe 9	☐
3. NOS ÚLTIMOS 12 MESES, ALGUM ADULTO DA SUA FAMÍLIA COMEU MENOS ÀS REFEIÇÕES OU SALTOU REFEIÇÕES PORQUE NÃO HAVIA DINHEIRO SUFICIENTE PARA COMIDA ? Sim ..... 1 Não ..... 2 Recusa ..... 8 Não sabe 9	☐

18 – INSEGURANÇA ALIMENTAR	18 - INSEGURANÇA ALIMENTAR
Atenção: Se registou 1 ou 2 em P.1 ou P.2 ou 1 em P.3, faça P.4, P.5 e P.6; caso contrário → Fim do Questionário	
4. QUANTAS VEZES É QUE ISSO ACONTECEU ? QUASE TODOS OS MESES ..... 1 ALGUNS MESES MAS NÃO EM TODOS ..... 2 APENAS EM 1 OU 2 MESES ..... 3 Recusa ..... 8 Não sabe 9	☐
AGORA, EM RELAÇÃO A SI PRÓPRIO(A), DIGA-ME:	
5. NOS ÚLTIMOS 12 MESES, ACHA QUE COMEU MENOS DO QUE DEVERIA PORQUE NÃO TINHA DINHEIRO SUFICIENTE PARA COMER ? Sim ..... 1 Não ..... 2 Recusa ..... 8 Não sabe 9	☐
6. NOS ÚLTIMOS 12 MESES, SENTIU FOME MAS NÃO COMEU PORQUE NÃO TINHA DINHEIRO PARA COMPRAR COMIDA ? Sim ..... 1 Não ..... 2 Recusa ..... 8 Não sabe 9	☐

AGRADECIMENTO

MUITO OBRIGADO PELA COLABORAÇÃO